



Root Canal Filling.

By FORREST H. ORTON, D.D.S., St. Paul, Minn.

The editorial in the March issue of *ITEMS OF INTEREST* challenges my interest to the degree of calling forth a reply from me, not with the hope of answering the question, but with the desire to express my opinion upon a problem of grave importance. I say that I do not hope to answer the editorial. I believe that our limited knowledge of the many factors involved in a scientific consideration of the matter precludes the possibility of a satisfactory answer at this time.

I heartily commend the title of the editorial, "The Greatest Problem of the Day in Dentistry." I will go one step further and say that if only a small percentage of the serious systemic ills credited to the teeth are really traceable to them, then this is not only "The Greatest Problem of the Day in Dentistry," but a very serious problem for the general public as well.

It is unquestionably true that any method of treating root canals that does not consider the pecuniary point of view will be much restricted in its application. It is likewise true that a technique requiring a high degree of skill and accuracy will also be restricted in its application. But I believe thoroughly that the average dentist is both willing and

anxious to do whatever is necessary to be successful. He wants to be fair both to himself and to his patient. The trouble is that he finds himself in the situation of not being able to acquire the knowledge needed to do the best work. Observation and experience are not enough; accurate knowledge, based upon unimpeachable statistics, is imperative. Let us have less vociferation and more verification.

**Imperfect
Statistics.**

On the other hand, a review of the recent literature dealing with the problem of root-canal treatment, with its apparently convincing array of statistics, is almost enough to lead one to conclude that we have accumulated and classified sufficient knowledge on the subject. The difficulty, however, is likely to arise in the interpretation of statistics. A recent writer, one who has been heralded as an authority on the subject under discussion, states that ten per cent. of the teeth, present mechanical or other obstructions which render any attempt to clean and fill them to the apical foramen, either inadvisable or impossible. Just what these statistics mean is left to be determined. Whether this authority has arrived at this conclusion from an intimate knowledge of the roots of the thirty-two teeth contained in a normal arch, or otherwise, is not made plain. Even if this were his method, a study of the morphology of the root canals might reveal some startling variations and anastomoses that would not be suspected from the external appearance of the roots. Perhaps this ten per cent. is a record of the teeth he has failed to treat successfully by the painstaking method described; or perhaps it is a tentative opinion.

Another writer from my own neck of the woods has created some consternation, not alone among dentists, but among general practitioners as well, by the announcement that of "1,000 teeth examined by him, seventy-one per cent. showed well-defined abscesses." He states further that "our surgery in pulp removal and root filling has nothing to do with its causation except to create an area of lowered resistance, thereby encouraging colonization of bacteria already afloat in the blood stream; that blind abscess is not primarily a dental disease, but is of hematogenous origin, and therefore a secondary lesion."

These conclusions are generally regarded as having only a speculative value as yet. The weak point in the statistics given is the absence of any previous history; that is, what per cent. of these blind abscesses were present at the time the teeth were treated and filled, and what per cent. of these teeth were filled under ordinary aseptic conditions? Other writers on this subject have stated that from fifty to ninety per cent. of the root canals filled were not filled to the apex. General accusations

such as these should not, in my opinion, receive serious consideration unless writers accompany their statements with full particulars of how their statistics were obtained and how interpreted. Statements are only incontestable upon such a basis as this; and it is time that dentists employed this method.

**Examination of
Tooth Roots.**

In our own Dental Infirmary at the University of Minnesota, all teeth that show a history of devitalization are being X-rayed, but we have not as yet obtained sufficient data to be of statistical value.

I have doubts as to whether our data will ever be sufficient, for the reason that the patients received at the dental infirmary have, as a rule, selected their previous dentists from the pecuniary point of view. It is obviously not fair to judge the type of work done in any given community by such statistics.

The point of this whole discussion is that statistics are a most valuable and indispensable instrument of science. Many truths can be arrived at only by their use. Yet the possibilities and the dangers of the statistical method might not be suspected by the average dentist, unless he has been trained at least in the rudiments of statistical science. It is commonly said that statistics properly juggled can be made to prove anything. What is needed is a knowledge of scientific methods of accumulating data and a passion for interpreting them truthfully; they are not to be used with the idea of proving some preconceived notion. The statistics I have quoted, and others like them, all too frequently circulate solely on the assumed reliability of the author who gives them out; and the average dentist neither has the time nor the inclination, and perhaps not the knowledge to analyze the so-called proofs submitted. I do not mean to question the sincerity of these writers. I do not doubt their good intentions nor their honesty; but it is certainly true that untrained investigators often use their statistics with the sincere conviction that they do actually prove the conclusions reached; whereas a little careful analysis would often show the conclusion to be fallacious.

Much is said in these days of the use of the radiograph in root canal work. While the radiograph is unquestionably an assistance, it must be noted that its value is limited. Some one is sure to arise at this point and say that given a good radiograph the limitation consists only in our ability to interpret. To interpret what? Our ability to recall the anatomy of the roots of the particular tooth! This presupposes an intimate knowledge of the anatomy of the roots of the teeth. What does a picture of Trafalgar Square mean to a man who has never been there? A

square surrounded by buildings with a statue in the centre, but to a man who has lived there the picture is full of meaning.

The surface anatomy of the crowns of the teeth has been minutely described by Doctors Black and Broomell, but the roots of the various teeth have not been so exhaustively treated. It is true that a typical example of the various roots is described, but very little is said of the many variations to be found. What per cent., for example, of the various teeth are true to type? And are the variations sufficiently constant to be classified?

To quote from the editorial: "A number of our most careful and skillful dentists have proven that root canals can be properly treated and properly filled if the proper technique be employed, which includes two and often more radiographs, etc." Have you noticed that when these radiographs are published they always show normal roots? Are we then to infer that only normal teeth can be properly opened up and filled? I fully realize that inclination, skill and patience in the operator will often be a deciding factor; on the other hand, an operation that requires a high degree of skill can only be performed by those possessing such skill. It is implied that what we need is a method of treating pulp canals by the dentist of average ability, that is, some practical standard. Our dental colleges yearn for a similar solution of this same problem. It was with the hope of throwing some light on this subject from which it might be possible to evolve a teachable technique that the Dental College of the University of Minnesota undertook to classify the roots of the molar teeth. In this we were seriously handicapped by the difficulty of obtaining a sufficient number of first and second molars. We have succeeded in obtaining from various sections of the country upwards of 1,500 teeth. These teeth were arranged on long tables. The tables were covered by paper charts marked off by squares somewhat like a checker-board and numbered on two sides. Each chart accommodated 100 teeth, one tooth to a square. The upper first molars were classified first, then the upper second, etc. Mr. Henry, a senior student, has devoted his spare time for two months in classifying and arranging these teeth in groups according to the variation presented. We have only given the work such cursory examination as our duties would permit, and we do not feel, therefore, that the data thus far collected has been sufficiently analyzed and classified to be presented in statistical form. It is given here merely that you may realize that the conclusion reached is more than mere surmise. Judging from the surface anatomy of the roots of the molar teeth, which, being held in the hand, may be viewed from every angle, not possible with a radiograph, which throws a bucco-lingual shadow, we have thus far concluded the following data:

**Molar
Roots.**

The percentage of teeth which may be successfully filled decreases at a very rapid rate as we go toward the distal. I think a little reflection will convince you that this is a logical deduction: the first molar is developed at a time when there is more room, hence its environment is more favorable, so that we would naturally expect it to follow type; the second molar is more likely to be crowded mesio-distally, resulting in a greater percentage of variations in the buccal roots. The third molar shows all the stigma which characterize rudimentary structures. The occasional appearance of a fourth root in the form of a small spur branching from one of the buccal roots, or those roots which present a decided buccal curvature, would show a very mysterious shadow to the dentist whose knowledge of roots was based solely on the radiographs.

I believe that a study such as I have outlined will not only convince the average dentist of the seriousness of the problem, and enable him to interpret rightly the radiographs, but it will make him more loath to devitalize the second and third molar; or appreciating the large percentage of variations which might be expected, the radiograph might be the deciding factor as to whether it would be best to attempt to treat the tooth.

We expect to follow this root classification with a study of the morphology of the root canals, using the technique outlined by Professor Gartano Fasoli, of Milano, Italy. I suspect that fused roots will show the presence of organic matter: canals which may be given off below the pulp chamber, or anastomoses between main branches and the number of apical foramen will frequently be found which could not be detected in a radiograph. It is only fair to state that this latter conclusion is only an opinion, but it is based upon the embryology of tooth development.

In conclusion, permit me to say that I fully realize that I have not solved any of the problems suggested by this timely editorial. But I trust that what I have said will be regarded in the light of constructive criticism.

I cannot close this somewhat lengthy communication without deploring such complications as the story of the pretty young lady with the exposed incisor pulp and the limit of five dollars for that particular tooth suggests. I acknowledge the popularity of the *ITEMS OF INTEREST* and the necessity of appealing to every type of mind, not only to those who are moved by moderate reflection and scientific trains of argument, but those who need an extreme type, and I yield to no man in my admiration of youth and beauty—and I think I can fully visualize the anguish of this poor but beautiful maiden compelled to part with so essential a factor



from an aesthetic point of view—yet such sentiment does more credit to our hearts than to our heads. What we need is some standard. We may always compromise in extreme cases. But if the short-cut methods of filling root canals lead to malpractice suits, sentiment may be out of place. I earnestly urge a continuance of the discussion, "The Greatest Problem of the Day in Dentistry."

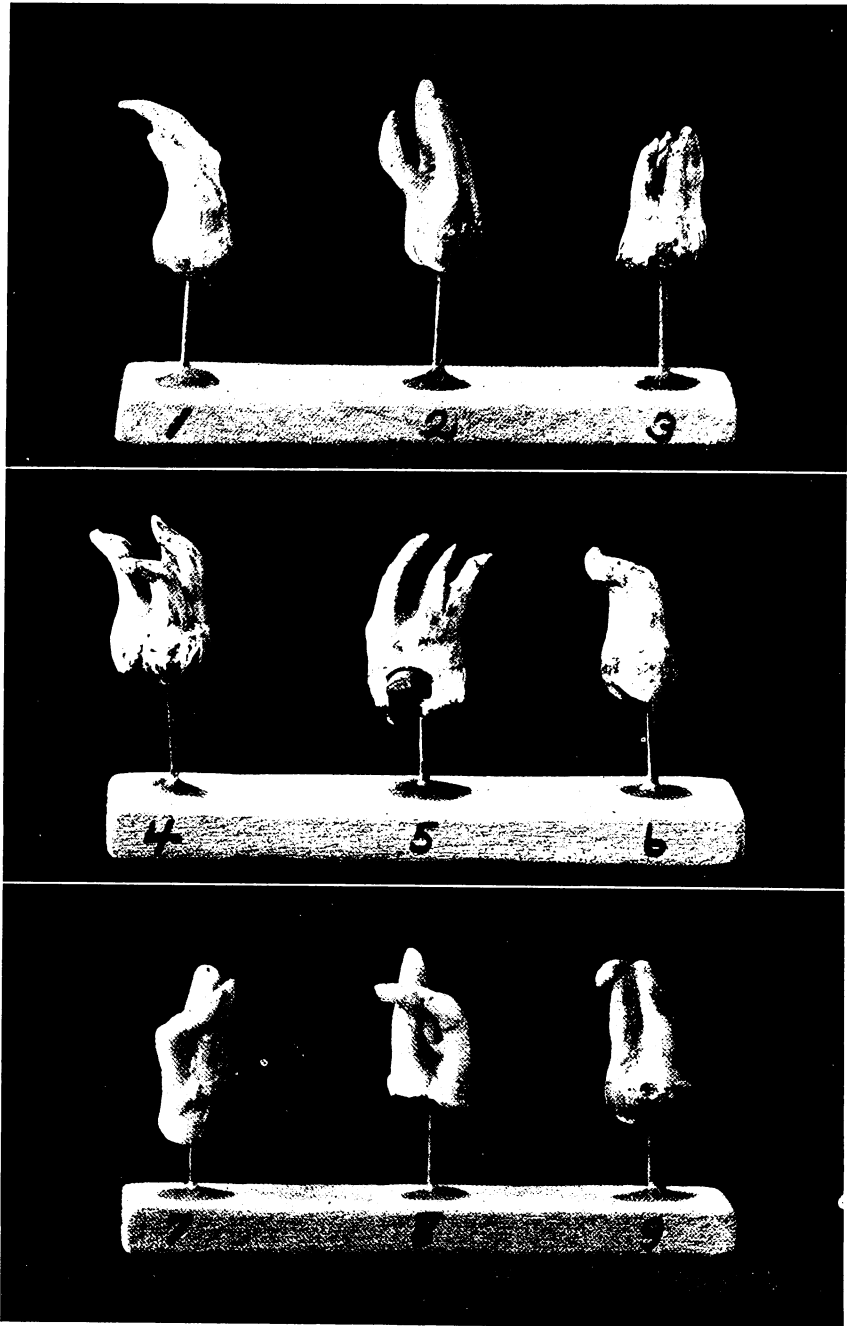
Root Canals Which Cannot be Filled.

By A. F. PERKINS, D.M.D., St John's, Newfoundland.

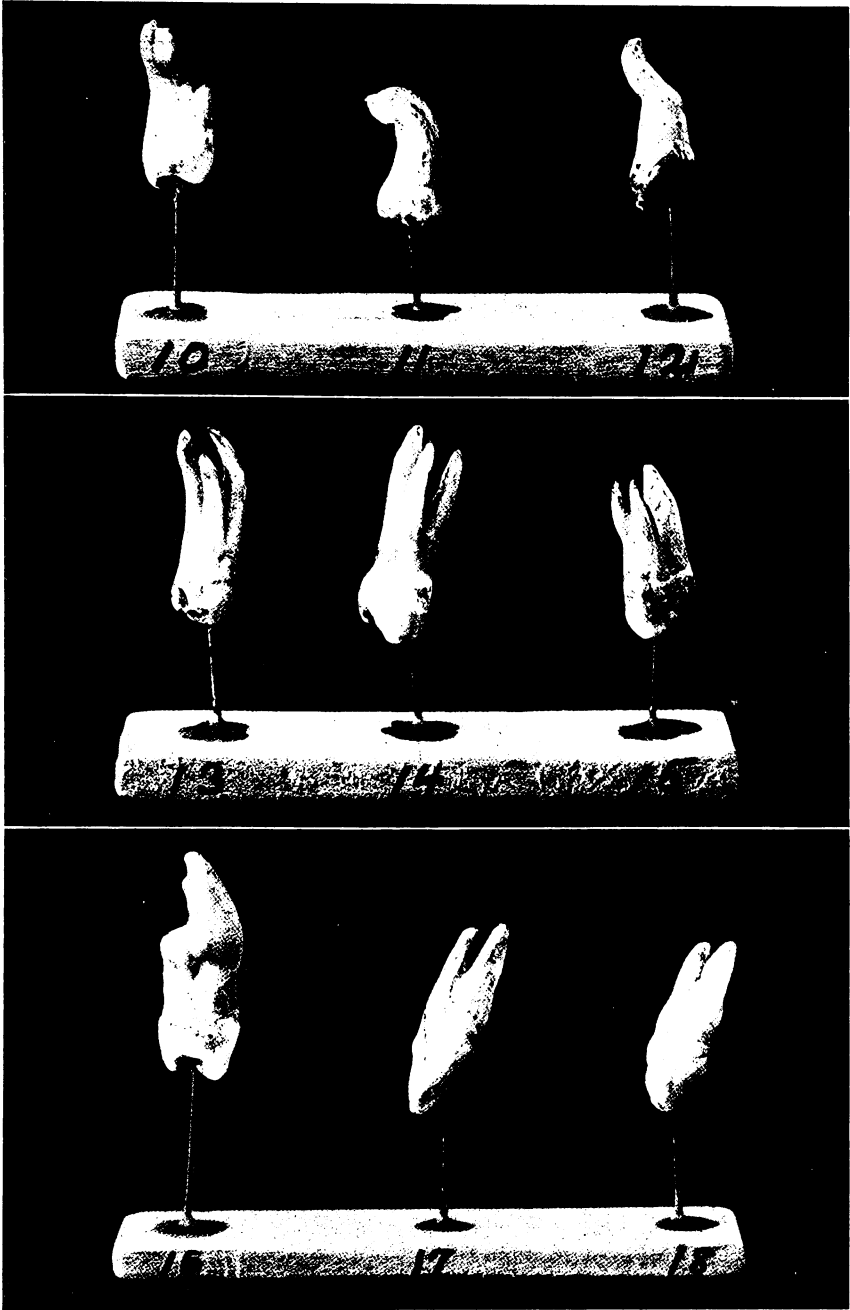
I have been following the various articles that have appeared from time to time in ITEMS OF INTEREST and other dental magazines in regard to treating teeth without pulps, and also destroying pulps that are exposed, or nearly so. What interests me more particularly is the constant caution of these writers to "fill the canals to the apex," with the statement that unless they are so filled, failure will follow and a chronic septic condition at the root end will persist that will cause many grave systemic conditions. The last mentioned condition is only too true, for I have had many patients in my practice who recovered vigorous health by the extraction of these teeth with perfectly filled (?) root canals.

The point that I wish to bring out in this little article is this: Will we not serve our patients better by extracting teeth that become "tender" after careful treating, where to the best of our mechanical skill we have filled as we think to their apical foramen? By "tender" I mean even a little bit tender, if only noticeable at odd times or by tapping with an instrument. I am sure, from past experience and observation, that extraction of these teeth is the only safe means to keep these patients from serious systemic trouble.

Impossible to Fill All Canals. I do not believe the man lives who can fill every canal as he ought, no matter how much he boasts that he can. True, he may fill single-rooted teeth now and again, but his great enemy to success is Dame Nature herself. I am convinced that teeth with malformed and badly twisted roots and anomalies are as common as the normal roots. And once these roots deviate from normal or become twisted, they are beyond the power of any man to fill, or to even remove their contents perfectly. I do not mean that I advocate wholesale extraction, far from it; but I do mean that every tooth which gives *even a little* trouble after careful treatment *should be extracted*. Then if the tooth



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troubles I feel sure that there exists some twisted root or anomaly, and extraction in nine out of ten cases has proven that I was right in so doing.

Limitation of Radiography.

We are told to use the X-ray to verify our work. Yes, but do these pictures show all the details that are necessary; every twist and turn of the root? I think not. Would it have shown that the cuspids in Figs. 17 and 18 had two roots. The picture being taken from the front, the palatal root directly in back would not be shown, but a correct filling for the labial root would be shown, and then we would be at a loss to understand why the tooth was not comfortable. So was I, at first, but not so much so after I had extracted them. *A single canal only* showed after the pulp chamber was opened, and being a single-rooted tooth, as all (?) cuspids are, was all I had reason to expect to find. The illustrations are of teeth (treated teeth) taken at random from a large number that I have kept after extraction, and while unusual, are really not the uncommon run of teeth. In my opinion, irregular and twisted roots are nearly as common as those normally formed. And this leads me to the conclusion that we really fill correctly only about sixty per cent. of all root canals we treat, X-ray experts to the contrary, notwithstanding.

Explanation of Illustrations.

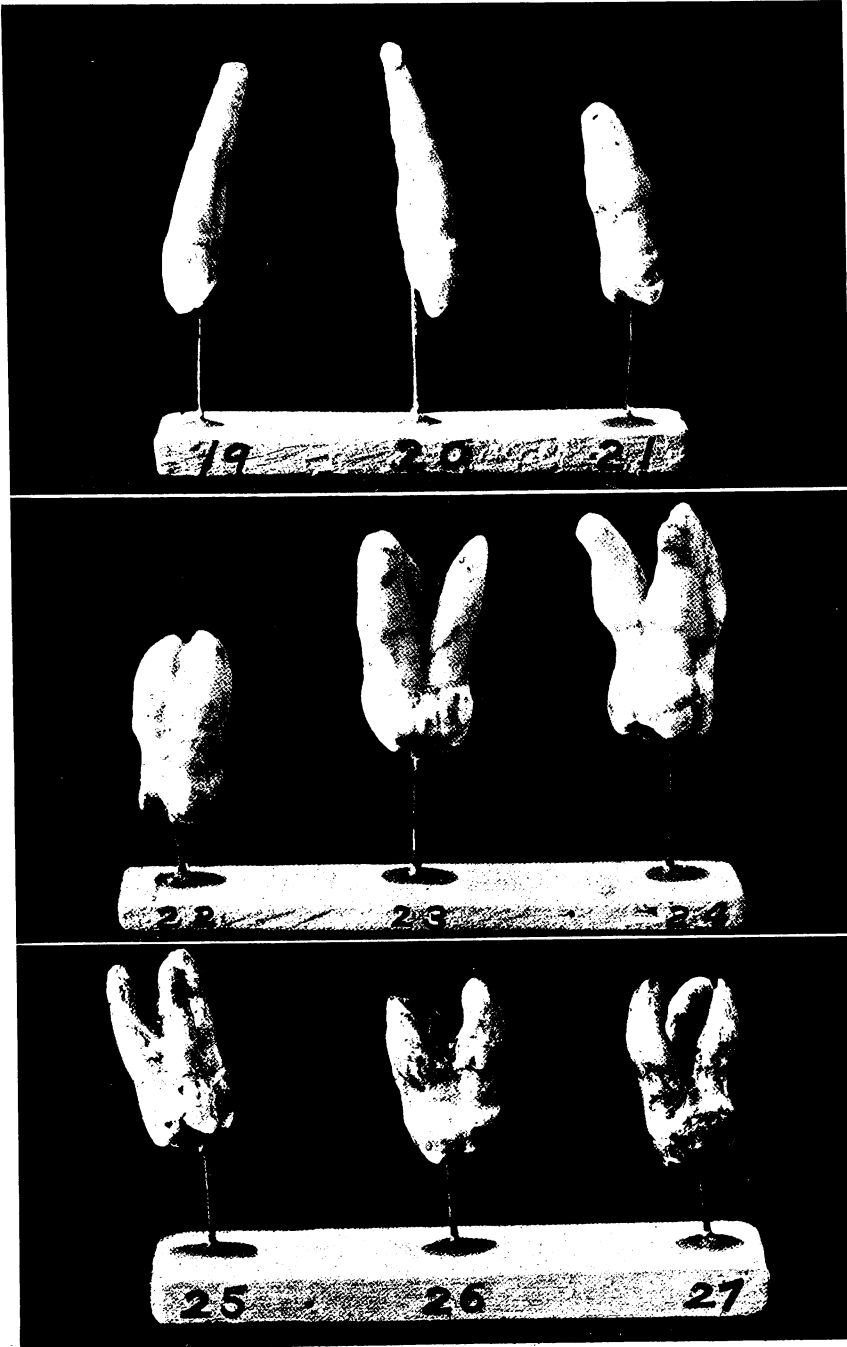
In Fig. 1, an upper second molar, it was an impossibility to extract perfectly the pulp in the palatal root, as you see it takes four distinct turns, and the broach is not made that will take these turns and come away whole. Fig. 2, another second molar, is again a mechanical impossibility, as the canal does not start from the pulp chamber, but branches from the other buccal root, and would be missed entirely by the broach. Fig. 3, a third molar, speaks for itself; impossible of correct filling to the apex of any root. And here let me state that I do not believe in even attempting to treat an upper third molar. If it has reached a point where treatment is indicated, treat it at once—with a pair of forceps. The canals in upper third molars vary from three to five, and always have their root ends slanting backward at nearly right angles. Figs. 4 and 5 are second molars; Fig. 6, a bicuspid; 7, 8, 9, second molars; 10, 11, bicuspids; 12, a central. Figs. 13, 14, 15, are first bicuspids, which I thought might be of interest, as having three distinct roots. Fig. 16, a bicuspid, another twisted impossibility. 17, 18, double-rooted cuspids.

Cases of Excementosis.

Figs. 19 to 27 are all from the same patient, and might interest your readers. The patient, a young woman, had suffered for a long period from excessive headaches, which were gradually wearing



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her out, and at times almost sent her into convulsions. Her doctor had tried everything to cure her, but she got no relief. Examination of the mouth showed only two teeth with cavities, very tiny, all others being perfectly sound. After a great deal of thinking, I decided to extract all her upper teeth. Every one showed excrementosis, as seen by the illustrations. She made a complete recovery, and has never had further attacks of headache. The cuspids were over $1\frac{1}{2}$ inches long, the longest I have ever seen, and the molars simply enormous. I am only sorry I did not have a scale taken with them so that one could get a better idea of their bulk and size. I used a local anesthetic for this extraction, but had I known that I was to encounter, I would certainly have given a general one.

The Treatment and Filling of "Root Canals Which Cannot be Filled."

By RODRIGUES OTTOLENGUI, M.D.S., New York.

Two writers in this issue declare that there are many roots of teeth so distorted, or so anomalous, that the correct filling of their canals might prove a mechanical impossibility.

It is, of course, true that there be canals which cannot be filled. This being true, it is of tremendous importance to determine, were it possible to do so, just what proportion of teeth come within this category. This is important, because if the young practitioner should believe that any large proportion of root canals cannot be filled it would soon become his habit in the presence of difficulties to say to himself: "This is one of those canals that no man can fill."

It is for this reason that articles like those under discussion, however sound they may be, and however true the deductions of the writers, are almost to be deplored because of the mischievous effect which they have upon the minds of men just entering practice by affording apparently scientific excuses for doing less than one's best.

Nevertheless, Dr. Orton's article is published with pleasure, because it is an appeal for more accurate statements by men dealing with this and allied subjects. Dr. Perkins's communication is particularly welcome because of his fine illustrations which afford us graphic pictures of teeth which he considers unfillable, and thus makes it possible to discuss the debatable question, "What is an unfillable canal?"

**What Proportion
of Canals are
Unfillable?**

Dr. Perkins does not believe that the man lives who can fill every canal as it should be filled. This, of course, is true. It is likewise true that because the proportion of unfillable canals is declared by men of repute to be higher than it really is, many practitioners fail to fill canals which they should be competent to fill accurately. The appeal therefore is not for the impossible, but that the possible should be attained more frequently.



Fig. 1.



Fig. 2.

**Single Rooted
Teeth Often
Unfilled.**

Dr. Perkins says that men "may fill single-rooted teeth correctly now and again." It seems to be commonly believed by the majority of dentists that they can fill canals in single-rooted teeth without trouble and without the aid of the X-rays; that it is only the multi-rooted teeth that are difficult, and that at least one root of all molars is easy. Yet it can be proven by the records of any radiographer that single-rooted teeth in a large proportion of cases examined are imperfectly filled, and that in molars, when the finer canals are found unfilled, the larger canal is usually but partially filled also. If this statement is seriously doubted, the writer will undertake to obtain proof of it from a dozen radiographers.

The moral (or immoral?) of this is that the present handling of root canals by the majority of dentists is woefully inefficient, this inefficiency being only to a slight degree dependent upon contortions, constrictions and anomalies.

It may be true, as Dr. Perkins says, that "we really fill correctly only about sixty per cent. of all the root canals which we treat." But if true, it is a disgrace to American dentistry that it should be true,

because no such proportion of cases is unfillable. But how does Dr. Perkins arrive at this proportion? Dr. Orton truly says: "General accusations such as these should not receive serious consideration, unless writers accompany their statements with full particulars of how their statistics were obtained and how interpreted." Speaking of the claim that root canals can be filled if the proper technique be used, aided by radiographs, Dr. Orton says: "Have you noticed that when these radiographs are published they always show normal roots?" And Dr. Perkins presents us with an exhibit of photographs of twenty-seven teeth, the abnormalities of which he thinks would preclude the possibility of correct root canal fillings.

**The Filling of
Canals in
Abnormal Teeth.**

In response the writer begs leave to present radiographs of roots which were not normal and which nevertheless were satisfactorily filled. This is done, not with any disputatious intent, but rather in the hope of contributing a little evidence which may aid us in determining what is and what is not possible in the management of anomalous conditions. Moreover, the writer has no doubt that more skilled operators might even further lessen the field of the supposedly impossible by reporting cases.

As evidence of the previously made statement that failures in root canal fillings are not restricted to multi-rooted teeth I introduce Fig. 1. Here we see two crowns and a gold filling in three adjacent single-rooted teeth, not one of which shows a correctly filled root canal. Moreover, all three roots are abnormal. The cuspid root is abnormally long and fairly well matches Nos. 19 and 20 of the Perkins exhibit. The first bicuspid has a curved root and the second bicuspid has a root abnormally short with a canal completely obliterated by deposition of secondary dentine. Fig. 2 shows all three root canals filled to the apices, or one might say at their apices, as the radiograph was taken prior to the completion of the root fillings, a precaution which I recommend in difficult or doubtful cases, as it is manifestly better to learn that the apex has not been reached, should such be the case, prior to packing the canal full of gutta percha.

Nos. 17 and 18 (Perkins exhibit) are double-rooted cuspids, and Dr. Perkins tells us that the radiograph would not have disclosed this fact, a correct root filling in the labial canal hiding the unsuspected lingual canal. But we should always suspect a cuspid of having two canals, and the radiograph should always be taken so that the two canals, if present, would be seen. I have found and I have filled double-rooted cuspids, but have no radiograph of such a case good enough for reproduction. Fig. 3, however, will cover this point quite well. Here we see a double-rooted



Fig. 3.



Fig. 4.



Fig. 5.

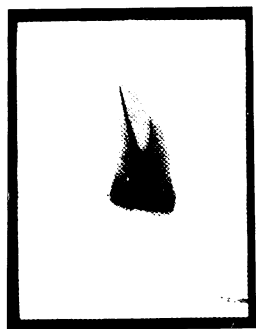


Fig. 6.

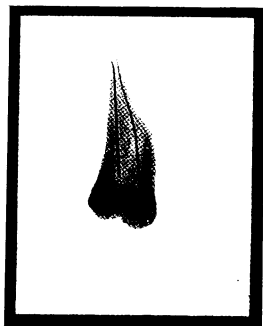


Fig. 7.

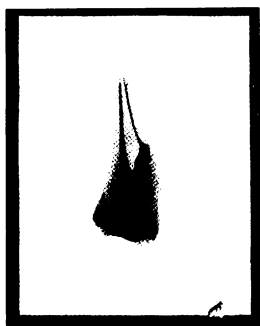


Fig. 8.

bicuspid with wires in both canals clearly visible, and Fig. 4 shows both of these canals filled. In passing, attention is called to the root filling in the cuspid, the root of which is curved at the end. Considerable chloro-percha has passed through the apex, yet the root has remained uninfected, though it was filled ten years ago. Still I freely admit that I prefer such apical sealing as appears in the bicuspid.

Dr. Perkins's No. 1 shows a tooth of which he says that the broach is not made which would follow the curves of the canal and come away whole. Of course, I cannot speak of this identical tooth, though I should be glad to have it for a test case. However, Fig. 5 shows a tooth very like it. This was sent to me a year ago with this terse note: "When you have the time and inclination, please fill the canals of this one." Following routine, a radiograph was taken first. It is shown in Fig. 6, and here we see that the dentist who treated this tooth prior to extraction left parts of broaches in both canals. There were but two. This accords with Dr. Perkins's declaration regarding this type of tooth, and perhaps he will admit that this case, with both canals obstructed with steel, presented quite as difficult a problem as his No. 1. Fig. 7 shows this tooth with broken broaches removed, and wires passing to the apices of the canals. Fig. 8 shows the canals adequately filled in spite of the curvature and extreme fineness of one of them. The broaches were removed after repeated applications of the Callahan method of using sulfuric acid and soda. The time required would perhaps have been prohibitive in the mouth, but surely we have proven that a correct technic used in the first instance, and carried out without the breaking of instruments, might have resulted in the correct filling of this tooth, which a man of national reputation declared to be an example of the impossible in root canal work.

Let us consider numbers 6, 10, 11 and 12. No. 6 is impossible, and perhaps, note that I say perhaps, No. 11. Yet both could be saved by filling the canal as far as possible and amputating the unfilled portion.

Nos. 10 and 12 are difficult, but within the realm of the possible. Let me present a similar case.

Fig. 9 shows a first bicuspid, with curved root and broken broach in canal. Fig. 10 shows both canals cleansed of débris with sodium and potassium, and wires introduced. The radiograph shows the wire in one canal resting against the broken broach, while the wire in the other canal passes beyond the other end of the broken broach, indicating that the two canals terminate at the same apical foramen. This knowledge made it possible deliberately to bur away the broken broach, and Fig. 11 shows the condition after removal of the broken broach. Here also we see a wire passing through the apex and note that the cutting away has per-



Fig. 9.



Fig. 10.



Fig. 11.

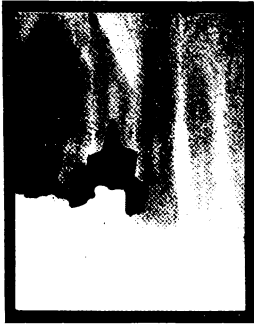


Fig. 12.



Fig. 13.



Fig. 14.

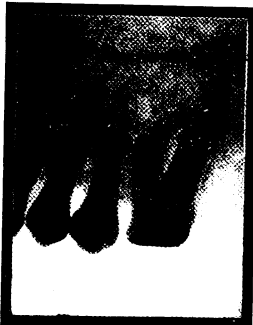


Fig. 15.



Fig. 16.



Fig. 17.

mitted this wire to pass in a straight line. Fig. 12 shows this root filled.

Nos. 13, 14 and 15 are bicuspid having three roots. I have never treated one in the mouth, though I am constantly on the watch for such a condition, as I have seen bicuspid which have even as many as four canals. Beyond the fact that the operator might overlook a third canal (which he should not do), a three-rooted bicuspid offers no greater difficulties than a molar of similar form. To match Nos. 13, 14 and 15.



Fig. 18.



Fig. 19.

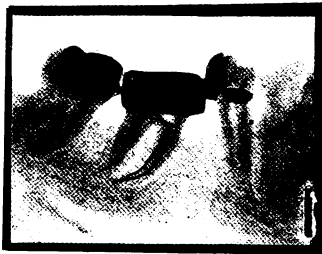


Fig. 20.

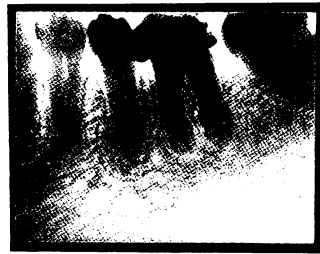


Fig. 21.

therefore, I present Fig. 13, a particularly long-rooted upper molar of quite similar shape.

As a mate to No. 2, I present a similar upper molar. Fig. 14 shows this molar with mesio-buccal root badly curved and the disto-buccal root masking the palatal. Fig. 15 is the same with wires to ends of all three roots. Fig. 16 shows the canals filled, but as the palatal root is masked, a radiograph was taken at a different angle, and in Fig. 17 we see that all three canals are filled.

We have now to consider roots of the type seen in Nos. 4, 7 and 8, where the curvature is very great. It is possible that these particular teeth might have proven too difficult, but let me show one which I undertook with great hesitation. Fig. 18 is from a lower molar with badly



curved roots, the curvature, however, being more distinctly seen in Fig. 19, where the wires are in place. Fig. 20 shows these root canals filled.

Dr. Perkins tells us that No. 3, "a third molar, speaks for itself; impossible of correct filling to the apex of any root." Perhaps. Yet if I needed that tooth for a bridge abutment I should not hesitate to undertake the root filling, and moreover, I should expect to succeed.

Of No. 16 I must say that I could express no opinion without a radiograph. Despite its contorted external appearance the canals may be easy.

We have left Nos. 19 to 27, all from the same patient, and all examples of excementosis. These teeth, according to the history, were removed, not because of the impossibility of filling the canals, since no attempt in that direction is recorded.

In these cases there seems to be authority for stating that two conditions may maintain. First, the excementosis may exist without obliteration of the foramen. Secondly, the new growth of cementum may completely cover the foramen, rendering the canal impervious at the apical end.

In Fig. 21 we see both conditions. In the second lower bicuspid we observe a root filling which does not reach the end. Radiographs satisfied me that the canal was impervious beyond this point, and as the alveolar bone appeared healthy, no attempt was made to penetrate further. Had an abscess been present I should unhesitatingly have drilled through the end, creating a foramen artificially for the purpose of drainage and treatment. In the adjacent molar, treated some years later, because of the death of the pulp and abscess, the foramina were found present. The canals were cleansed and wires passed to their foramina and the canal filled. (Fig. 21.)

In conclusion, I have only to repeat that this is merely an appeal against the too ready decision that a given canal cannot possibly be filled. The more canals men try to fill, the more canals will men fill.



A New Method of Attachment for the Loop Arch.

By **RAY D. ROBINSON, D.D.S.,** Los Angeles.

Read before the American Society of Orthodontists, Toronto, Canada, July 2, 1914.

From the time of the use of the metallic arch by Fauchard down to the present, a variety of methods have been utilized to secure attachment of individual teeth to the arch, and for the application of force for various purposes. The original arch of Fauchard was merely a form to which the teeth were brought by the immediate force applied with forceps, or by the gradual shrinkage of the various kinds of contractile ligatures, such as cotton and silk thread. Then came the elastic metal arch by Patrick, Farrar and Angle. The anchorage bands were also largely the result of the work of Angle, Lukens, Barnes, Kemple and others.

A variety of tooth movements by various methods and authors is also of historic interest and might be of value to consider had we here the time to discuss them in their various relations.

The screw force as developed by Farrar, the elastic arch of Patrick, the steel tempered wire fingers and loops by Jackson, the elastic rubber bands of Case and Baker are well-known methods which have in their various times and several ways done much to make modern orthodontia a scientific art.

The author's experience with the Angle arch, with its system of wire ligatures, has frequently caused him and his patients so much worry and anxiety that he longed for a simpler and less troublesome method of applying the arch, and also for the development of a force which while constant would be under such complete control that it would be more easily tolerated by patients.

More recently the so-called Angle attachment of tube and pin with the three-piece arch was a decided advance over the former one-piece arch with ligature attachments, but its construction and adaptation require such exact adjustment that but few men have the technical skill to apply it to the best advantage for securing desired alignment of the teeth, and it leaves much to be desired in those cases where great expansion is needed. This latter objection, however, in large measure, should be overcome by the looped arch suggested by Dr. J. Lowe Young. I have, however, to confess that I have not seen Dr. Young's adaptation nor have I any personal acquaintance with his particular invention.



Fig. 1.

The appliance which I have to present for your consideration is a loop arch attached to the teeth by a series of definitely formed angular blocks, soldered to the arch and resting securely but not immovably in corresponding seats which are soldered to the bands on the teeth.

The idea in designing this appliance has been to secure all the needed tooth movements by a single appliance that is easily adjusted and that will not require frequent inspection nor continued surveillance, exerting at all times a delicate and positive force rather than inducing a severe force intermittently applied.

The following description of the apparatus is abstracted from an article contributed to the June, 1914, *ITEMS OF INTEREST*:

"The appliance consists of a delicate spring arch (Fig. 1), bent to conform to the individual dental arch to which it is to be applied, with loops extending toward the root or toward the occlusal end, as may be found convenient, placed in advantageous position; and an attachment consisting of a seat (Fig. 2) soldered to a plain band on the tooth and a square hollow block of metal, the outside measurement of which is the same as the inside of the seat, and the bore of which is equal to the diameter of the arch wire (Fig. 3).

"The seat has a flat base and parallel walls extending at right angles to the base, the walls being fifty per cent. higher than the width of the base, which allows sufficient material to bend over the fourth side of the block, thus enclosing it in a square tube which it accurately fits (Fig. 4).

"In constructing and applying this apparatus, the bands with seats attached are first made and cemented to the teeth, using a form of anchor band."

At this point I wish to deviate from the published article and describe a form of anchor band devised since the article from which I have been quoting was written. This anchor band is a modification of the

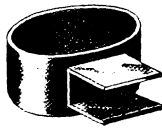


Fig. 2.



Fig. 3.



Fig. 4.

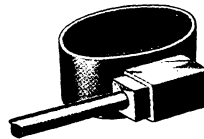


Fig. 5.

Lukens' band. The modification consists of making the tube post with a square socket extending approximately one-half its length from the screw end, leaving the square end of solid metal; and a locking device which will lock the post on any quarter turn. The locking device consists of two holes drilled at right angles with each other through the solid portion of the tube post in a position which will bring them under the metal collar on the band and two holes drilled through the collar in alignment with each other in such a position that they will come opposite the holes drilled through the post. This permits the tube posts to be locked by a delicate pin on any quarter turn, thus assuring an absolutely rigid attachment to the anchor tooth, and also assuring a bodily movement of the anchor tooth if it is desired. This form of anchor band, having been placed on the anchor teeth, I will now return and read from the article published.

"The requisite number of blocks being placed loosely on the arch wire, a long block (Fig. 5) is soldered to one end of the arch, which is then



put into place in the square socket in the anchor band and the arch bent in such a way as to bring it into the adjacent seat, a loop being formed if desired. One of the blocks is now brought to the proper place on the arch wire to engage in the seat. The arch is then taken from the mouth and the block soldered. The arch is again placed in the mouth and again bent to bring it into alignment with the next seat, it being understood that loops are formed between such seats as is deemed necessary for the development of force and for the directing of the movement of the teeth. This operation is continued until all the teeth requiring movement have been engaged, when another long block is soldered to the other end of the arch to engage in the other anchor band.

"After polishing, the arch is next put into place and the extensions of the walls of the seats are bent over the four sides of the blocks (Fig. 4).

"It will be readily seen that the attachment between the arch and the tooth is absolutely rigid, and any movement of the arch wire will in time be registered in the tooth.

"In that form of appliance, having tubes soldered to the bands parallel to the long axes of the teeth and posts soldered at right angles to the arch to engage in these tubes, such absolute accuracy of adjustment in soldering is necessary as to make the appliance efficient only in the hands of the skillful technician. It must also be appreciated that as the planes of the post and arch are at right angles to each other, any inaccuracy in alignment will be magnified in the tooth movement, whereas with this appliance and its accurately fitting blocks, inaccuracy in construction and adjustment are practically impossible. The long axes of the arch wire and the block, which is to be soldered to it, not only lie in the same plane, but the arch wire actually passes through the centre of the block, eliminating all possibility of error in alignment.

"As the block can both rotate and slide on the arch wire, it is easy to place it in the exact position required by forcing it into the seat. Once it is in its proper place, it is pinched slightly with pliers to prevent its becoming misplaced while being carried to the flame for soldering. Thus it will be seen that it will require the grossest carelessness to make an error in transverse alignment.

"There should be no trouble in bending the arch wire into the desired form. The wire commonly used is 24-gauge B. & S., and very frequently 26-gauge wire will be sufficiently heavy. As the first block is soldered before any bending is necessary, and as it holds one end of the wire rigidly in its proper position, and as the bending can be done in the mouth, the writer can see no reason for either error or difficulty in bending the arch, even by those of average ability.

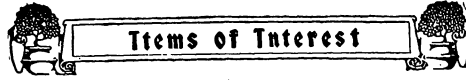
**Tooth
Movement.**

"A little study of this appliance should convince the most skeptical of its efficiency. It will be seen that by springing a loop open, force will be brought to bear on the teeth adjacent to that loop. As, for instance, opening the loop in the incisor region will exert force in the direction necessary to widen the arch as far as the cuspids. If it be found necessary to carry the incisors labially, the loops in the cuspid, bicuspid and molar regions will be sprung open. If it be found necessary to carry the incisors on one side mesially, and those on the other side distally, without carrying them labially, as frequently happens, through the premature loss of one of the deciduous cuspids, it can readily be done by opening a loop placed over the cuspid region where the space is to be made and closing one over the opposite cuspid region. If found necessary to widen the arch in the bicuspid and molar region without widening the incisor and cuspid region, it can be accomplished by slightly opening the seats on the incisors, allowing the blocks to slide distally through the seats and then opening the loops in the incisor region. It will be readily seen that the force generated by opening these loops will be exerted in the desired direction and place.

"If a movement tending to throw the apex of the root buccally or labially is desired, it can be secured either by bending the adjacent loops in the desired direction or by taking the arch from the mouth, heating the block, and while hot turning it in the desired direction. When again placed in the mouth, it will be found necessary to spring this block to place. When the edges of the seat have again been bent over the block, it will exert force that will cause the apex to move in the desired direction. If it be found necessary to move the apex mesially or distally without disturbing the relative position of the crown, it can be accomplished by bending the adjacent loops in the directions indicated. It will readily be seen that more than one of these movements can be accomplished at the same time. In fact, any desired movement of the teeth can be accomplished without disturbing other teeth which may be in their proper places. The reasons for this are: That the attachment between the tooth and arch wire is absolutely rigid, and second, the force necessary to the tooth movement is generated at the point where it is to be applied.

"The force being that of a spring and generated from small, delicate wire loops is not violent in its action, but slow and delicate, although none the less positive. Being of this character, the result resembles a physiologic rather than a pathologic action, causing the minimum of pain and requiring a shorter period of retention.

"The force is more directly applied, is longer continued, is more



Items of Interest

easily controlled and causes less annoyance than that generated by any other appliance with which the writer has had experience.

"It is obvious that a triangular block, or any angular or oval or round block, with a pin raised on one side, placed in appropriate shaped seats, would accomplish the same results. It is also obvious that the converse of this is true, that is, the same result would be accomplished by placing the seat on the arch wire and the block on the band.

"The attachments could readily be used on the old form of arch, depending on screw force, but the writer finds the force generated by opening the loops to be of such a character as to produce better results with less annoyance."

Since writing the article from which I have just been quoting, I have found a different form of block to be easier to handle than the square one. This form consists of a flat base and parallel walls extending at right angles to the base for about half their length and then converging to a point opposite the centre of the base. This form gives absolute rigidity and requires that the seat walls shall be bent at a less acute angle, making the appliance easier to handle on account of the ease with which the seats may be repeatedly opened and closed and assuring a longer life to the seat.

Realizing that on first inspection of this appliance your principle objection would be that the seats are liable to fracture under repeated opening and closing, I will show three forms of seats that will lock the block securely into place without the bending of any metal. Each of these forms is efficient, but the writer has experienced so little difficulty through breaking of the seats, and he finds that locking the block by bending the seat walls is so much simpler that he prefers this method to any other.

The advantages of this appliance as they have appeared during the more than two years of its development into its present form may be summarized as follows:

Advantages of the Method.

First: A more perfect control of tooth movements. All the different tooth movements are easily and comfortably accomplished with definiteness and saving of time for all ages and patients that are amenable to treat with any other appliance.

Second: Freedom from ligature troubles. Because of the design there can never be irritated or diseased gums, cheeks, lips or tongue from obtrusive projections, and every facility for cleanliness is secured. All attachments in the form of bands are accurately fitted and cemented to the teeth, so that no part of the metallic appliance comes in actual contact

with the tooth tissues, thus precluding the possibility of erosion of the teeth even though the treatment be unusually prolonged. The arch can be so formed and adapted that at all times it should lie close to the teeth, obviating serious objections to many forms of appliances formerly used.

Third: Facility for changing form and making repairs. The seats may be readily opened and the arch released when occasion requires such a procedure. In fact, the entire arch can be removed for soldering into place a new block or to change the position of a block, or to repair a

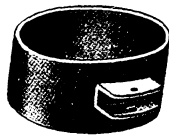


Fig. 6.

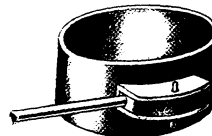


Fig. 8.

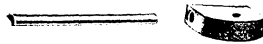


Fig. 7.



Fig. 9.

broken seat or band. The seats are capable of being opened and closed many times without impairing the integrity of the metal. Thus it will be seen that the appliance is amenable to such repairs as are customary with all other appliances, and with equal facility.

Fourth: Retention. Teeth moved with this appliance are less difficult to retain because the movements are less violent than with some appliances. Under this treatment absorption and tissue rebuilding take place in a more nearly physiologic manner because of the nature of the force applied. However far such a tooth may be moved, it is at all times supported and protected from shocks that would retard new tissue development. Consequently, when the movement is concluded the retention period should be much shorter than when the teeth are moved by the intermittent forces. In fact, the writer finds that the moving appliance makes an excellent retention appliance. This is accomplished by opening all the seats when the movement is concluded, and the loosened arch is so bent that each block will be dropped back into its correspond-

ing seat and lie passive; the seats are then closed and the teeth remain at rest.

During the development of the appliance, the writer first used a square wire for the arch; he then tried a triangular wire and afterwards a flat wire, with appropriately shaped seats and locking device for each form of wire. These forms proved about equally efficient, but all had



Fig. 10.

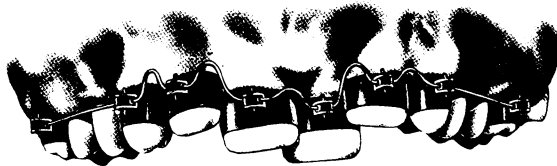


Fig. 11.

the common fault of producing a completed arch of unequal expansive force when loops were put into the wire, owing to the sharp angles produced when the arch was bent. This was due to the fact that equal resistance is not obtained when, for instance, a flat wire is bent in the direction of one of its flat sides one time and in the direction of the edge the next time. Still greater uncertainty is encountered in bending a square wire in any angle between the flat side and the corner. In using these angular wire arches it was not necessary to solder blocks to the arch, as the arch wire could at any place be locked securely into the seat. The advantage of being able to put in loops at any angle without producing unequal elasticity so far outweighs the small disadvantage of soldering the blocks onto the round wire that there is now no question in the writer's mind as to the superior merits of the round wire for the arches.

Another advantage of the appliance is that when it is once adjusted with bands cemented and the arch locked into place in the seats, it is so firmly fixed that the patient has no power to disturb it or to interfere with

its operation. It can be so delicately adjusted that the patient has no desire after a few days to interfere with it in any way.

What the writer believes he has a right to claim is originality in discovering a form of attachment which effectively supplants all former wire and ligature methods with a more easily adjustable and more secure attachment, which he also believes has distinct advantages over the tube and post attachments.

If a delicate but positive force under perfect control, which can be applied over a long period of time without attention, is desirable, the loop arch will give it. If a rigid attachment that will insure absolute bodily control of the tooth, and one that can be applied or released at will quickly is desirable, then the seat and block attachments meet these requirements.

Since preparing this paper, some sixteen months ago, the writer has modified the form of lock as illustrated in Figs. 6-9. The seat (Fig. 6) consists of a flat oblong base and two flat parallel walls rising at right angles to the base. The walls are rounded at the top and each is pierced near the top with a small hole, the two holes being in alignment. The seat is made of platinum-gold and is .022" thick. The distance between the walls or across the base of the seat is .040".

The block (Fig. 7) is of platinum-gold, but harder than the seat, and is .040" thick and shaped to fit inside the walls of the seat above described, except that it is .005" greater in elevation than the side walls of the seat, which provides means for its being forced into the seat with a pair of pliers, when there is stress on the arch wire to which it is soldered. The block (Fig. 7) is pierced by two holes; the larger runs longitudinally and its bore is equal to the diameter of the arch wire used, or .020". The smaller hole is through the transverse diameter of the block near the top and is in the exact place to be brought into alignment with the two holes in the seat walls when the block is forced into place in the seat. The block is locked into the seat by placing a delicate pin through the seat walls and the block (Fig. 8). When so locked, no play is possible. The two parts are made to fit to the minutest fraction of an inch, and as they have three flat walls in apposition, and are tightly locked together, they do not permit of any play whatever. The molar and anterior attachments are alike, except that the molars are the longer (Fig. 9).

Fig. 10 illustrates a case in which all the bands, with seats attached, have been cemented into place ready for the arch.

Fig. 11 illustrates the same case after the arch, with the blocks attached, have been locked into place.

This form of lock has overcome any liability the older form may have had to work loose under stress of mastication.

Discussion of Dr. Robinson's Paper.

Dr. Waldron. I cannot say very much for or against this type of appliance as recommended by Dr. Robinson, because I have not been using it for more than seven or eight weeks, but I am, however, trying it out on two cases. I cannot agree with Dr. Robinson that it is so simple in its construction, but possibly familiarity will overcome this difficulty.

In making the bands for the incisors I should recommend that they be carried under the gingival margin on the labial surface of the teeth, as advised by Dr. Young in his description of banding teeth for the new Angle appliance. This would lessen the susceptibility of caries, inasmuch as the tooth would be protected from the influence of putrefactive matter which would lay from time to time between the loops in the expansion arch and the teeth.

As far as the efficient control of this appliance, I am not in a position to state with my short experience with it, but I think the operator would have to familiarize himself with the dynamics of this arch, for bending the loop in one direction will exert an equal force in the opposite direction. Therefore, you must have your resistance always greater than the force to be moved, and to do this, as I have stated before, requires a greater knowledge of the dynamics of this arch than I possess at present. I have been amazed at the amount of expansion accomplished by this delicate appliance, and also that there has been no sign of tenderness since the appliance was put on.

The base wire which I used was twenty-four gauge, of gold and platinum, and to anneal this I place the wire on a copper pan, which is heated over a Bunsen burner to a red heat and then immediately I plunge the pan and its contents into cold water. This thoroughly anneals the base wire so the loops can be bent without fear of breaking.

It would be useless for me to discuss the technique of constructing this appliance, but I should prefer a semi-elliptical block and block seat to the square, or the five-sided block and seat as used by Dr. Robinson, because a square block would require bending the block seat to an angle of 90 degrees, and the constant opening and closing of the seat would soon result in breaking of the same, whereas the semi-elliptical block seat would not require bending at so acute an angle, hence the liability of breaking is much lessened.

In explanation of the fact that Dr. Waldron saw these bands so low down, it is only fair to say that he saw them on the plaster model sent to me from which an illustration was made. I do not think it possible with a plaster cast to make bands that would go up any higher than these were.

No doubt Dr. Robinson carries them nearer to the gum margin in practice.

Dr. Hawley. I would like to know whether Dr. Robinson is planning to furnish these parts to the members, or how we may obtain them.

Dr. Grieves. I have had no experience with these extremely light wires. The work I did for you some years ago was done with the Angle appliance and with gauges number 16 and 20 wire. I had the Bureau of Tests in Washington take that work up for me, so that all alloys entering into arch construction might be tested for resilience and elasticity, and the results were most confusing, particularly when heat was applied. These results varied in the German silver alloys proportionate to weight, gauge and consistence, so I reached the conclusion that alloys are very variable things, particularly the elasticity of the alloy as changed by annealing, which varied greatly when heated. A definite formula for the arch, annealed always under like conditions, in my humble opinion is the only way we will exert a definite force and get practical results such as Dr. Robinson claims. If the patient is not examined for a month or more, that seems like a long time to allow this force to act, and I fear it will vary greatly in different parts or buckles of the arch unless the wire is annealed with the greatest care.

Dr. Ottolengui. In reply to what Dr. Grieves has just said, I will say that Dr. Young has devised an annealer to cover exactly that point. He not only anneals the wire before he puts it into the mouth, but it is annealed again after soldering the parts added by being put in an electric heater, and it is controlled by a rheostat. Dr. Young claims that he gets uniform tension.

Dr. Grieves. Then his alloy must be the same in all instances.

Dr. Federspiel. How do you open the seat?

Dr. Robinson. With a small excavator spring up the extension wall of the seat.

A Member. What is the arch wire made of?

Dr. Robinson. The seat is made of iridio-platinum. The arch is made of .020" platinum-gold.

Dr. Federspiel. How do you move the apices of the teeth forward?

Dr. Robinson. The blocks are turned in the direction indicated so as to spring the wire and then forced back into position.

Dr. Munroe. Does not that exert pressure upon the back part of the arch?



Items of Interest



Dr. Robinson.

Certainly. There is no action without an equal and opposite reaction.

A Member.

Is it possible to make many movements without moving the arch?

Dr. Robinson.

Practically all the movements can be accomplished without moving the arch from the seats. The elongation or spreading can be accomplished without unlocking a single block. Where it is necessary to put tension on a tooth, it is essential to unlock and change the position of the particular block intended for that tooth.

Dr. Hawley.

How long does it take and how often do you have to see the patient?

Dr. Robinson.

I see my patients only once a month.

Dr. Hawley.

I meant relative to the action of other appliances.

Dr. Robinson.

You can use the Angle appliance and widen the arch more quickly than with this, but this will require a shorter period of retention. I have a case that was passing into the third month since any pressure was applied, and the teeth are still moving. The contention is that while the pressure is more delicate than it is with a bigger form of arch and screw force, it is constantly applied over a much larger period.

I want to say this regarding the loops between the seats, that it makes no difference if the appliance itself does get out of shape, because when it is put back into the mouth the blocks are forced back into the seats again, and if they do not lie there passively the loop is bent until they do lie passively. The appliance is absolutely passive when put into the mouth. It has no tension in any direction.

I have taken out a patent on this appliance for the protection of the profession, not to make money out of it in any way, and in order to be sure that the profession will be protected in this if this association will take over these patents I would be glad to present them to the association, so that you may have the appliances manufactured properly, and if there is any profit it can go into the treasury of the association for a special purpose or any purpose you may desire.

There is just one thing in connection with what Dr. Waldron has said that I wish to speak of. The parts were beautifully made by a machine designed by a man from my city. He can make the appliance as it should be made, and if the association accepts these patents, I would like to see that this man gets a legitimate manufacturer's profit, because he has put in a great deal of work and ingenuity in making it.



The Principles, Functions and Construction of Saddles in Bridgework.

By HERMAN E. S. CHAYES, D.D.S., New York.

The saddle is that part of a bridge which rests upon the mucosa and supports the artificial tooth or teeth.

The greater the area covered by the saddle, the more stable will be the support of the bridge under the stress of mastication.

The size and design of saddles must vary as the kind and number of artificial teeth supplied and as the condition of the underlying tissue.

Single anterior teeth may be supplied with a saddle no larger than the gingival circumference of the teeth themselves, provided that the artificial tooth is attached to parallel natural abutments by means of parallel attachments at its mesial and distal extremity.

The saddle as a means of relieving the stress upon abutments is a far more important factor in upper posterior bridges than in lower ones, because the mandible is the moving member of the masticating machine—or its power arm.

The ultimate shape of a saddle must be calculated not to encroach upon the gingival circumference of the teeth adjacent to the edentulous space.

A saddle should not be movable upon the mucous membrane, but should move with it. It may be correctly compared to a pontoon bridge moving with the tidal motion of the liquid upon which it rests.



The area of a saddle should equal the area of the roots of those teeth which are being replaced with the artificial ones carried on the saddle.

A saddle must be so shaped buccally and lingually that it will not encroach upon any of the muscles while at rest or in function.

A saddle must be perfectly adapted to the subjacent tissue.

A properly cast saddle is more perfectly adapted to the subjacent tissue than one which is swedged.

The same amount of care, skill, labor and attention to detail will yield a better saddle by the casting process than by the swedging process.

The displacement of tissue which occurs beneath a saddle when in function can be well taken care of by the provision of a chamber on the palatal or linguo-mandibular side of the saddle. The size and shape of this chamber should vary in proportion to the area of tissue upon which the saddle rests and with which it moves when the teeth it carries or supports are in function.

The saddle should be as thin as the stress to which it will be subjected will permit, and it should never be of a bulk which would prove obtrusive to any of the surrounding and adjacent or subjacent tissues.

Physiological Functions of a Saddle.

The muscles of mastication are the motor, the artificial teeth, resting upon the saddle, are the driving or vibrating shaft, and the saddle is the applicator which massages the subjacent mucosa and underlying structures when the artificial teeth are in function.

The more perfect the occlusion of the artificial teeth, the more rhythmic the periodicity of the intermittent pressure transmitted through the saddle intermediary to the subjacent tissues.

The more rhythmic the periodicity of the intermittent pressure, the more rhythmic the waves of vibration engendered by the intermittent pressure and transmitted through the saddle intermediary to the saddle applicator, thence to the adjacent and subjacent living tissue, and the more perfect will be the vaso-motor action of the nutrient vessels of these tissues.

All the foregoing is in harmony with the statement that a bridge is an artificial partial denture resting upon a floating base, its motion being aided to a degree limited by parallel attachments constructed in accordance with the geometric conception of the arc being tangent to a straight line.

Again teeth, natural teeth, our own teeth move in the exercise of their function; they move in various directions, the degree and direction

varying as the complexity of function, being little and more or less simple for incisors and intense and multi-directional for trituration.

**Errors of
Improperly
Constructed Saddles.**

A saddle which is imperfectly adapted to the underlying mucosa, and which cannot move while the teeth are in function, will always cause resorption.

A saddle which snaps into position by means of some clasp or clamp attached to it, and which after reaching its position is about as stable as a gate upon loose hinges, will always cause resorption.

A saddle which is perfectly adapted to the underlying mucosa, and which is held there against all lateral displacement, will always cause a hyperernia and finally resorption.

A saddle which is perfectly adapted to the underlying mucosa, and is held there against all vertical and lateral yield, will bring about a distinct pathological change in the underlying tissue, finally resulting in resorption.

The sequellæ of these pathological end tissue changes are systematically far-reaching in deleterious effect and must be avoided by the following means:

**Correct
Construction
of Saddles.**

A saddle must be perfectly adapted to the underlying mucosa and it must be held in place by parallel attachments, which engage parallel abutments and which will allow a limited vertical bucco-lingual, a linguo-buccal and to a very limited degree a mesio-

distal yield.

The extent of vertical yield is determined by the elastic limit of the subjacent tissue upon which the saddle rests. A halt must be called before the limit of displacement has been reached.

The extent of bucco-lingual and linguo-buccal yield is controlled by the degree of the arc created upon the attachments, and the degree of the arc is determined by the conditions of the subjacent tissue being greater for soft and easily displaced tissue, and less for hard and unwillingly yielding membranes.

The mesio-distal yield is effected by having the attachments which hold the saddle in position consist of double metallic plates, elastic in action, with a minute space between them.

A saddle perfectly adapted to the subjacent tissue and held in place with attachments as described will not cause any resorption, provided that subjacent tissue is organically efficient and without taint.

The Planning, Moulding and Casting of Saddles.

**Impressions
for Saddles.**

An impression tray which is large enough to take in all the area desired and which will not strain the mouth is selected.

A base-plate wax barrier is formed around the distal part of the tray to prevent the flow of the impression material into the throat.

The impression tray is filled with a creamy mix of plaster, and with a broad spatula, the parts to be reproduced are covered with the plaster.

The tray is carried into the mouth and gently brought into position to cover the parts.

If it is an upper impression, the tray is held in place with one hand, while the other extends the check and upper lip of the patient and brings it down taut over the plaster-covered buccal and labial margin of the tray.

If it is a lower impression, the tray need not be barriered against the flow of impression material and the other procedure is the same.

When the plaster has become sufficiently hard, the tray is removed and the impression is carefully taken out of the mouth in sections or as one piece if no undercuts are present.

If the impression is in several sections these are carefully assembled and waxed together in the tray.

**Method
of Pouring
Cast.**

The impression is now covered with a thin separating fluid-shellac, or thin colored sandarc varnish.

When this has become dry it may be thoroughly soaped and the cast is made with a good hard plaster.

It is helpful to surround the impression with a sheet of wax or paper so as to confine the model plaster, and it is best to insert the model plaster into the impression in small quantities with the aid of a small-sized badger hair brush until every part of the impression has been covered with a thin layer of the model plaster. Larger quantities may then be added until the required bulk is obtained, when the impression containing the model plaster is inverted upon a glass slab and left there until the cast is hard enough to be separated from the impression.

No satisfactory substitute for model plaster for saddle purposes has as yet been found.

The artificial stones at present obtainable are not suitable for this purpose; their working qualities are unreliable and the results uncertain.

When the cast is sufficiently hard it is carefully separated from the impression and trimmed to symmetrical form.

**Planning
the Saddle.**

With a soft pencil the shape and extent of the proposed saddle is marked off and two definite landmarks, such as gingival margins of adjacent teeth, or protuberances, are included in the area.

A broad groove is cut into the model lingually or palatally and buccally or labially. This groove begins about 2 mm. below the pencil marks and may be all of 3 mm. deep and 3 mm. wide.

The model is lubricated with a thin oil and a sheet of Platcheck wax, of suitable thickness and sufficient size, is softened in warm water, 110 degrees F., and placed over the model.

A ball of absorbent cotton is dipped into the warm water, and with this the wax is gently but efficiently patted or swedged to place. When the adaptation is satisfactory the saddle is trimmed to outline as indicated by the visible pencil mark.

**Relief Chambers
in Saddles.**

If a relief for displacement of subjacent tissue is to be provided, which is only necessary when the saddle is to be extensive enough to carry more than three teeth, the position and extent of this relief is determined upon, and with a lance a circular section of the wax is removed.

A piece of Platcheck wax about 3 mm. larger in diameter than the area exposed is placed over the opening, but not forced into it, and with a warm spatula it is joined to the wax saddle.

A narrow strip of the same wax is placed over the ridge for reinforcement, and such other places as may be subjected to marked stress are reinforced into the same manner.

A small quantity of inlay wax is added to the centre of the saddle and into this the slightly heated sprue-wire is inserted in such a manner that when invested there will be a nearly equal quantity of refractory compound all around the saddle.

**Investing
Saddle
Patterns.**

The ideal way of investing patterns for saddles is to insert the sprue-wire in such a manner as will bring the sprue hole and all the saddle area into one continuous line. Unfortunately, the range of our present casting machines and flasks is entirely too small to allow such procedure, so that we are forced most often to insert the sprue-wire at right angles to the saddle, and are thus compelled to cast into 360 undulating radii of a circle; a difficult procedure, even under favorable circumstances.

When the sprue has been properly placed, the wax is chilled with cold water, the refractory compound is mixed, and with a small brush the entire area of wax is carefully covered with a mix, with which the groove upon the model is also filled to overflowing, so that the mix which covers the wax and the grooves will flow into one mass, which is gradually added to until a body of refractory compound from 2 to 3 mm. in thickness has been built up over the model and sprue-wire.



When crystallization has taken place, the surplus is carefully trimmed away until the margin of the wax saddle becomes visible all around.

The model is smartly tapped upon the bench several times, and the saddle will be found to loosen; or compressed air may be blown against the model at the margin of the saddle. Practice will facilitate this part of the technique.

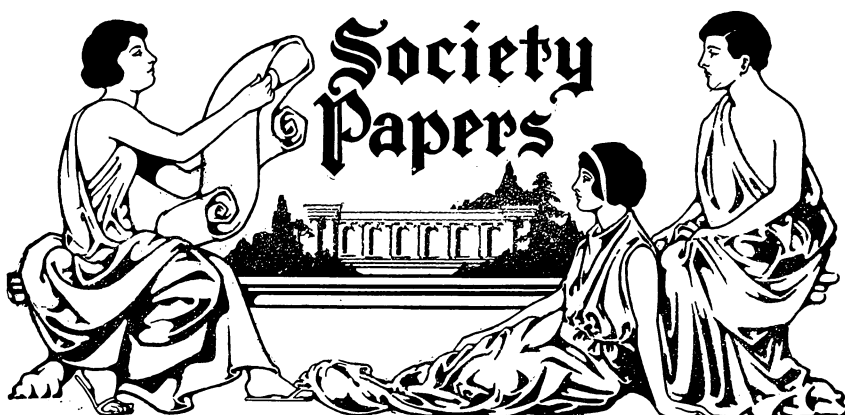
The sprue is now inserted into the crucible former and another mix of refractory compound is made.

When this is ready, the crucible former and partly invested saddle are held under the running cold water for a few moments, and the now exposed and as yet uninvested area of the saddle may be carefully covered with the refractory mix, which must join the first investment without giving up any part of its water of crystallization.

When all of the saddle has been covered, the flask is placed over the crucible former and filled with the compound by pouring the latter in from the side until it rises to fill the flask. The crucible former is now held with two fingers of one hand, while the two fingers of the other rotate the flask upon its seat on the crucible former back and forth several times to insure a homogenous mass.

When crystallization has taken place, the surplus is trimmed off, the crucible former is removed by rotating it to the right, the sprue-wire is heated by holding the flask over a small Bunson flame, the flaked compound is carefully dried under a low heat. When steaming of the compound has ceased, the heat is raised, the wax is thoroughly burned out and the saddle is cast.





The Correct Treatment of Pulpless Teeth Must Eliminate the Possibility of Periapical Reinfection.

By M. L. RHEIN, M.D., D.D.S., New York City.

Illustrated lecture delivered before the Central Dental Association of Northern New Jersey, December 1914.

It is a great pleasure for me to be present this evening. I do not feel as a stranger in your midst, although I have not attended your meetings as frequently as I would have liked to, my presence has not been entirely unknown to you in the past.

As far as the general principals of pulp technique are concerned, they can be described in a very few words.

The Essential Requirements in Canal Treatment.

There are three essential points necessary in proper pulp removal. The first one should be the entire removal of every portion of organic matter that exists within the tooth, and I say that without any restriction. This means that it is necessary to reach the very end, in fact, to pass through the end of every root.

It has often been said to me, personally, that I claim to do this with every tooth. I have never made such a claim. When a man, in the interest of professional operations, devotes himself to pointing out the means which are at our disposal to reach an end, frequently his views are exaggerated beyond anything that he had in his own mind. I say this simply in my own self defense. As our experience in pulp removal increases, the percentage of teeth in which this is not practicable, becomes less, and if you should ask me to-night about what percentage of



cases I find where this is not feasible, I think I could, with entire truthfulness, say that seven per cent. would absolutely cover it. If experience will enable one to handle an operation with that small percentage of failures, there can be no question but that the operation should be strongly advised. Whenever it is impossible to remove all of the organic matter from the canals the tooth must be extracted. There can be no compromise if the danger of subsequent toxæmia is to be avoided.

The second desideratum in pulp technique is that the periapical region shall be entirely free from any pathogenic conditions, and, that means that if any have existed, they must be radically eradicated. In other words, before anything in the way of filling root canals is attempted the parts must be healthy; there must be no pathogenic conditions present, either in the canal or in the periapical region.

The third point is the proper hermetically sealing of the root canal, so that infection, ever after, is impossible, either from the periapical region, or from the pulp chamber of the tooth.

You all have been told of the incalculable injury which infections, resulting from imperfect root canal work, have done to human kind. Every year that dentistry becomes older, the medical profession is going to bring the responsibility for these organic lesions, resulting from imperfect dental work, more and more up to the dentist himself.

I want to make a confession at this point to you, gentlemen. I have been very highly lauded by your President in his introduction to-night, and I believe that to-day I am capable, in ninety-three per cent. of cases, of doing such pulp canal work as leaves the tooth free, not only from present infection, but from future infection. In reviewing my work for the past thirty-five years, as I have done, I have felt very much ashamed of a great deal of the work performed, and as I have noted it year by year, I could see the faulty results of my technique. This gradually led me to the technique which I now pursue. I say this because I think it will make us all feel better to realize that I have passed through the experience that I feel all of the profession must pass through, in order to fully appreciate the questions which are involved.

**Need of Filling
Through Apical
Foramen.**

The main point I want to bring to your attention to-night is, that, leaving a hermetically sealed root canal does not necessarily insure against reinfection, in the periapical region, if infection has previously taken place, unless the root canal is sealed hermetically in such a way that infection cannot reach this region. The message that I want to bring you to-night in regard to this vital point is, that I have discovered, by means of a great many radiographs that I have taken in the past years, that in order to reach such a result it is

necessary that the periapical end of the root must be sealed. I do not care how close your filling material reaches the very end of the root, *if the filling material does not pass through the end of the root, and seal every foraminal exit on the exterior of the root, you are absolutely unsafe—that is your patient is—against reinfection, and reinfection.*

Where infection has already been present, although you may have absolutely eradicated it, new infection will appear, and you will understand this if you will study the method and manner in which infections of this kind occur.

**Living Pulp
Left at Ends
of Canals.**

Where you remove living pulp and fail to introduce a correct root filling, and you have not had infections in the periapical region, my researches in such cases lead me to the inference that more than a majority of such cases become infected. I grant you that a very fair percentage of them do not become infected, but the fact remains that they are all liable to infection. The reason why many of them do not become infected is because in a large number of cases, some little portion of living pulp tissue is left at the end of the canal; it is not due to the medication you use. No pulp canal medication is possible that will prevent infection around the periapical end of a root canal, as you will understand if you study the question scientifically. A large proportion of these imperfectly filled root canals do not become infected, because some live matter is left, and the other proportion of such cases which have been imperfectly treated and no infection has resulted is due to the fact that the bacteria producing the infection that passes through the lymph channel with so much frequency, and is so common in these tissues, have not been active in that region, or there has been sufficient immunity at this particular point.

I trust I have made my point clear. Nothing has surprised me more, in my own development in this field of labor, than to have reached such a conclusion. My talk to you to-night will be a great disappointment to me if I do not prove this to your satisfaction from practical cases which I shall show to you.

**Blind
Abscesses.**

Before I put these pictures on the screen, let me reiterate the point that you very likely are familiar with. As a profession, we are not worried about acute alveolar abscesses. We know the gravity of those cases and we treat them surgically, and we take proper care of our patient. But we have come to learn what the little blind abscess does, which does not make itself felt, which is not irritating to the patient, and which the dentist in his blind confidence heretofore looked upon as a successful piece of work, because the patient has never found any discomfort from it.

We have all been educated up to that point. It is those blind abscesses that I want you to look at, and I want you to consider for a moment how they occur. The infection here does not come through the pulp; there is no pus present in such infection. The bacterium, if we speak of it here in the singular number, that is capable of producing pus, has not sufficient power and virility to make itself felt in such a way as to produce an acute alveolar abscess.



Fig. 1.

**Streptococcus
Viridans.**

It is, however, that little devil, the streptococcus viridans that we know has so little power, the most insignificant of bacteria, which has not the power to produce inflammation and subsequent pus, that demands your closest attention. Many dentists and physicians still seem to be unable to comprehend how this is possible. They say, "How can they produce infection when they do not produce pus?" These bacteria, when they produce a focus of infection, simply manufacture a limited amount of toxins, which pass through the defensive envelope which is formed around this little abscess, and it is these toxins which go to the organ that they undermine; and it is this point that I want to have clear in your mind—that we have no pus in those cases. Many of us have been confused by this. Over and over again I have had dentists come back to me and say, "You must be mistaken; I have opened this tooth; there is no filling in the canal; it is open; I have used peroxide of hydrogen; there has been no reaction, and consequently there can be no infection." They are mistaken, the bacteriological laboratory has proven their error. We have here the most insidious infection, without

the presence of any tangible pus. It is these cases that produce severe forms of heart disease; they do not kill in a day, nor in a month, nor in a year, or their connection with bad dentistry would have been recognized long ago; they simply cut off twenty or thirty years of a man's life, and this is a thing which some medical men are learning more about every day. Consequently, when we recognize the fact that this infection comes from the periapical region, and not through the pulp chamber, we have to so regulate our technique that there is nothing exposed around the end of a root that can become infected. In other words, there must be no bacterial nutriment left at the very end of the root. It is impossible to say a root canal has been filled so that wandering bacteria will find nothing to feed upon unless the filling not only hermetically seals the canal, but what is of greater importance, the periapical opening of every foramina. This is the message I bring you to-night.

I regret that time will not permit me to go into detail of technique to-night. I will show you on the screen radiographs taken from actual cases which will demonstrate the fact that when all infection has been removed and the periapical end of the root sealed, then only will ensue regeneration of alveolar structure.

If this is correct it excludes certain materials from being usable as a root canal filling. It excludes primarily every form of embalming material, as no pulp canal medication can prevent the infection of the end of the root canal. It excludes any filling material that will not adapt itself to seal the periapical openings of the foramina. Finally it excludes the use of any material which has any irritating action on living tissue. Gutta percha appears to answer this purpose best, mainly because of its unchangeable physical character and its great compatability with human tissue.

(The following are a few of the numerous pictures which were shown by Dr. Rhein:)

The first picture is a photograph of a section of the lower mandible, which perhaps illustrates this point a little better than a radiograph. (Fig. 1.)

I have every reason to believe that the alveolar abscess which you see here was the cause of the death of this individual.

The history of this case is very interesting. A young girl who had been my patient since childhood, while crossing the ocean during a storm, was thrown from her berth and her face was badly bruised. She remained in Italy for a year and three-quarters. Three weeks after landing her knees began to swell and she was compelled to use crutches from

**Technique
of Root
Filling.**

**Case
Histories.**

**Case 1.
Fig. 2.**



Fig. 2.

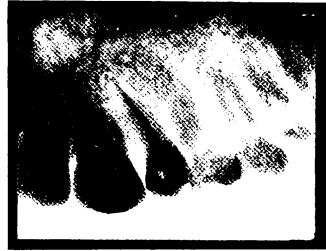


Fig. 3.

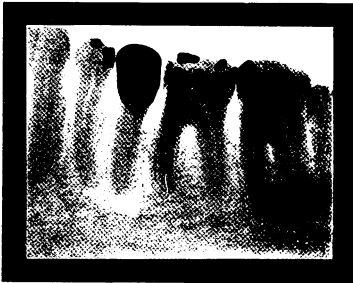


Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.

that time until she returned home. Upon arriving she was placed under the care of a specialist, but her condition was not improved. It was fully six months after her return before I saw her, when she remarked that for a few moments the day previous she had felt some slight irritation over the second bicuspid. Her mouth looked the picture of normality as to gums, etc. She had always kept her mouth in an ideal hygienic condition, and before the days of the X-ray I would have paid no further attention to the mouth. Fig. 2 is the radiograph taken at that time and shows the outline of the classic granuloma at the end of an upper second bicuspid.

The enamel of this tooth was without any flaw. Immediately upon examining the picture I realized that I had discovered the cause of her arthritis. My next patient was dismissed in order to give her immediate attention. Upon opening into the pulp chamber it was found filled with a reddish brown fluid, but without any indication anywhere of anything which by the greatest stretch of imagination could be called pus. With utmost aseptic precaution some of this fluid was withdrawn in a glass pipette which was passed into the root canal. The expected pure culture of streptococcus viridans was obtained from this.

Fig. 3 is a radiograph of this tooth a few months after the root filling was inserted and there is already distinct evidence of alveolar regeneration. Two weeks after the completion of the root filling the patient was able to dispense with her crutches and there has never been any return of arthritis after a lapse of three years.

Fig. 4 is a radiograph of a gold-capped lower bicuspid taken in October, 1913, in the mouth of a young man about thirty-six years of age, who died in February, 1914, from endocarditis. Twelve years before that the gold cap was placed on this tooth, and it distinctly proves that a gold cap inserted in this manner has the power to kill a man in twelve years. Although he was at once warned of the danger of toxemia, the dentist in whose care he was did not believe there was any infection, because on opening up the pulp chamber no pus was found. It was not until January when, because he was failing rapidly, the tooth was removed and the expected streptococcus was developed. It was, however, too late; a month later these micro-organisms were found in the blood and the patient died.

Fig. 5 shows another typical case of oral sepsis resulting from a gold cap placed over a lower molar.

Fig. 6 is a radiograph of a piece of bridgework sealing in the alveoli numerous foci of infection.

Fig. 7 shows an amalgam filling passing some distance into the root canals of an upper first bicuspid with a marked granuloma at the end of



Fig. 8.

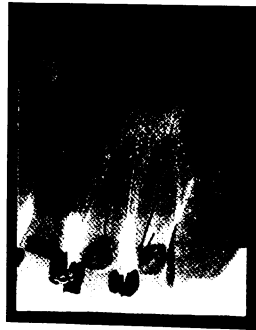


Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.



Fig. 15.



Fig. 16.

the root. The patient, a spinster aged about thirty-five, gives a history of endocarditis.

Fig. 8 represents the very starting of infection at the ends of two upper incisors after death of the pulps.

Fig. 9 shows the same case under treatment after the pulp contents have been entirely removed. Gold wires are now passed through the foramina in order to know that gutta percha can be forced through the foramina. This picture shows the wires passing through the ends of the roots. At the next sitting the periapical area is treated by means of ionization, preparatory to filling the canals, and the next picture, Fig. 10, is a radiograph showing the ideal root fillings encapsulating the root ends.

Fig. 11 shows an upper cuspid with a granuloma resulting from an imperfect root filling. This is one of my own root fillings inserted over fifteen years ago, before the day of radiography. It is a frank confession of my own failure at that time and most clearly illustrates the impossibility of doing honest root canal work at this day without radiographic checking. This root filling was at once removed.

Fig. 12 shows the root after the old filling was removed and the reaming of the canal is under way. The gold wire shows us that there still remains some unexplored portion of the canal.

Fig. 13 shows the corrected root filling taken a few years after being inserted and alveolar regeneration is well under way.

Fig. 14 is a radiograph from a patient who was hurt in an automobile accident. The condition of the first upper left bicuspid indicated death of the pulp from injury at this time. Alongside of the injured bicuspid is shown the canine from which I had removed the pulp twenty-three years ago. This root filling is an illustration of the fact that I did insert perfect root fillings at this time when I was able to reach the end of the root. The technique of inserting the gutta percha root filling was the same as used by me to-day. Your attention is invited to the solid homogeneous character of the filling, showing that it hermetically seals the canal and that gutta percha properly packed never changes. The most important value of this picture rests in the fact that the gutta percha is forced through the foramen and retains its position in the alveolar structure without the slightest sign of detriment to this delicate tissue. The absolute normality of the periapical region after twenty-three years is the best evidence of the correctness of this therapy.

The next two slides will illustrate the treatment of the first bicuspid.

Fig. 15 shows the tooth after the two canals have been cleansed, with gold wires projecting through their separate foramina and before ionization has been used. The destruction of the alveolar tissue emphasizes the normality of the alveolar structure around the canine.



Fig. 17.



Fig. 18.



Fig. 19.



Fig. 20.



Fig. 21.



Fig. 22.

Fig. 16 shows the tooth after ionization has been used and the roots filled. The absolute encapsulation of the end of the roots is well shown. It is also worthy of note that the fillings being parallel to each other obliterate their separate parts so as to give the false appearance of one root filling when in reality there are two separate fillings.

Dr. Gillet. How do you distinguish when there is a necrotic area and when there is not at the time of the operation, not waiting for a year to see if the condition is all right?

Dr. Rhein. You cannot absolutely distinguish it by means of a radiograph. There are all kinds of questions of angles, etc., that may be deceptive as to the integrity of the cementum. The history of the case is an invaluable aid. When there has been no previous operative interference it is safe to assume that the cementum is intact as the alveolar structure crumbles up with such ease that the force of the infection is turned against this weak tissue instead of the diseased structure of the root itself. Imperfection in focussing frequently leaves the impression of a defect in the cementum of the root.

Do not take away with you the impression that if the root filling passes through the foramen nothing else is necessary. This is only the final point in the operation, the one which clinches the nail. Every other essential point in the technique must be carried out just as faithfully.

I will now show you a very bad abscess still remaining, very likely getting constantly worse, although the root filling passes through the foramen. The close inspection of this will show that there is plenty of space between the gutta percha and the walls of the canal.

Fig. 17 shows a very bad abscess over the upper incisors; a probe has been passed through the fistula to the seat of the infection. Both incisors have very defective root fillings, the defects extending from the pulp chamber to the ends of the roots. The patient was brought to me for advise by his dentist, who desired avoiding the removal of some beautiful inlays. He wanted me to advise root amputation, but this would be absolutely wrong on account of the imperfection in the root fillings, which must be absolutely removed.

(In order to shorten this report I am at this point omitting a number of slides.)—M. L. R.

Fig. 18 is a radiograph of an upper incisor. There was an old chronic abscess over the central with marked necrosis of the root. After ionization had been used and the root had been properly filled the end was amputated by Dr. Schamberg. This picture was taken about one year

after the operations, and is shown in order to demonstrate the development of the new alveolar process which is progressing very rapidly.

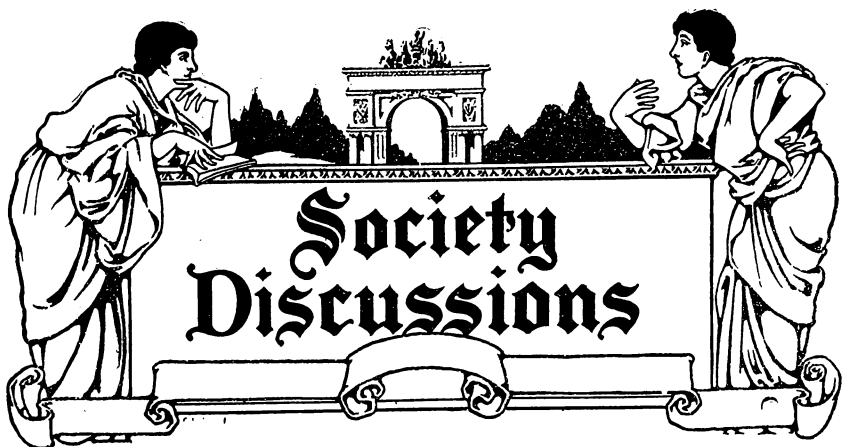
Fig. 19 shows a case that I have frequently exhibited. The radiograph is taken about nine years after two very severe abscesses have been radically cured. The regenerated alveolar structure is well shown and this new osseous tissue must always ensue if all diseased tissue is eradicated and no opportunity left for fresh infection to locate. The last case I will show has also been seen by members of my post-graduate study section.

Fig. 20 is a radiograph of a lower bicuspid showing a marked granuloma around the end of the root. The destruction of the alveolar structure is well marked.

Fig. 21 shows the diagnostic gold wire through the foramen of the root after the removal of the pulp contents.

Fig. 22 is a radiograph taken one and three quarter years after the root has been cured and the root filled. New alveolar structure is now seen to completely fill the territory which in the previous pictures was entirely devoid of osseous structure.





The Central Dental Association of Northern New Jersey.

Discussion of Paper by Dr. M. L. Rhein.

**Dr. F. S. Vaughan,
New York.**

I am heartily in accord with Dr. Rhein, in his attitude on the ideal treatment of pulpless teeth. The technical advances in dentistry during the last twenty-five years, with improved methods of crown and bridgework, have stimulated the saving of pulpless teeth that would otherwise have been consigned to the forceps, and in this way the public has been educated to demand that such roots be saved. This has placed on the dental profession a very great responsibility and, as yet, the dental profession has not responded to this responsibility, but, I think, progress is being made in that direction.

The recognition of oral sepsis as the cause of some forms of pneumonia, of endocarditis, and various other affections, has led the medical diagnostician to consider the teeth at fault until the contrary has been proven, and this has led to the greater employment of radiography in the diagnosis of such conditions, and it has been found, as Dr. Rhein has stated, that teeth filled by careful men, and supposedly all right, in the light thrown by the X-rays have been shown to be the source of infection. These infections may be from the small blind abscess, or the larger bone abscesses, or from even larger areas that have undergone cystic degeneration, and perhaps involved a large number of teeth; then we have them breaking into the antral sinus, or into the nasal chamber, or abscesses that discharge externally on the face, and others discharging internally, into the oral cavity. These conditions often demand very extensive sur-

gical treatment, in order to effect a cure—and all this due to imperfect root canal work.

As radiography has been a factor in discovering this imperfect work, it is just as important, as Dr. Rhein has shown, to use the X-ray to check off the treatment. Radiography is not a luxury; it is an absolute necessity in the light of what is being proven. No man can afford to do root work at all without its use.

The work in the past has been the treatment of existing abscesses; that of the present and the future is prevention, and everything is tending in that direction. The conscientious practitioner must grasp this situation, must strain every effort to follow up and indorse this idea by preventing or fighting, infections about the apices of the roots of the teeth. The medical profession is alive to the situation, and now there is no such thing as an excuse because of ignorance. The dentist must know, and he must do his share of the work efficiently.

I have heard Dr. Rhein discuss this subject of root work before, and I am very glad now to note that he has the courage and the modesty to come forward and say that he has made some errors in working out his present technique. I have heard other men remark that Rhein always claimed to fill every tooth absolutely, and I am very glad he has corrected that statement. However, he has shown what can be accomplished by persistent efforts and has given us an ideal to work towards.

**Dr. Henry W. Gillet,
New York.**

Dr. Rhein has provided many things to talk about, and I do not wish to be talking all night, so I will try to give you a forty minutes talk in the next ten minutes. Dr. Rhein's assertion that it is essential to seal the apex is correct; the demonstrations of the disastrous results of failure to do so are becoming so frequent, that there can be no exception taken to his general statement. The only loop hole there is for us is in the fact that so many radiographs show roots not filled to the apex in which there had been no trouble. That does not necessarily mean that there never will be trouble in those roots, but it does mean that the men who observe strict asepsis in root canal technique will probably have their reward on radiographing those teeth in finding a lesser proportion of trouble in their cases than will be the case with the men who have been careless in their technique.

For a long time it has been my custom to constantly apply the rubber dam when opening, or when working in, a root canal, and to clean away all débris, and flood the whole exposed field with ninety-five per cent. carbolic acid, and then with ninety-five per cent. alcohol before entering the canal.

In my hands, no instrument ever enters a canal which is not either just freshly out of the sterilizer, or freshly passed through ninety-five per cent. carbolic acid. Dr. Hartzell's technique is much the same, except that he uses iodine in cleaning up the field of operation in the place of carbolic acid. With the recent advances in our sterilizers this technique is not burdensome.

Every man who had adopted radiography in his daily practice acknowledges that in scanning his own work of the past the failures which surprise him most are in the straight roots. I will venture to say that half the men in this room will, in private conversation, if they have not had experience in radiography, declare their ability to constantly fill ordinary straight roots to the apices. I will undertake to say that if they will put themselves in the way of checking up by efficient radiography those teeth they are sure they have filled to the apices the result will provide them with some mighty big surprises. It happens frequently that I find single-rooted teeth that I thought I had filled well that are not filled more than two-thirds or four-fifths of the way up. If it were only with my own work that we were having that experience I would doubt my technique, but every man I know who has taken up radiography is having the same experience, and I know of no man who has taken up radiography in his daily practice, where he can take his patients into his own X-ray room and see the wet film in his own hands within six or eight minutes, who does not say that radiography is essential to the proper conducting of his practice. My own feeling is that if my X-ray apparatus were to be taken away from me to-morrow and I could not have it again, I should never touch another pulpless tooth.

**The Question
of Cost of
Radiographs.**

Now for a word on another side of the question. I find men hesitating over the expense of the equipment, expense to the patient, whether they can collect the money, and the difficulty of doing the work.

All those things are simple matters; they are just bug-a-boos, that you are building up to scare yourself with. You can get competent X-ray apparatus for anywhere from three to six hundred dollars, and most of you can take care of that expense; at any rate you have got to take care of it in some way, otherwise you have no defense and you are going to have a bad time inside of the next five years in maintaining yourselves in practice. If you cannot manage that individually, club together, and get ten or twenty men to purchase the apparatus. Perhaps you may live in a town where there are not as many practitioners as that; there you might get one man to do radiography and provide him with a good income. Any ten busy dentists ought to keep one radio-

grapher occupied, and if ten do not, get twenty-five, and when that man becomes reasonably busy it will be found an attractive opportunity for a young graduate who will fit himself properly to take radiographs at one, two or three dollars a piece. It is the same in your own work; just as soon as you are doing as much radiography as you should be doing the question of cost disappears. One man in New York City who does a good deal of radiography figured that in his practice the expense, aside from the few minutes of his time that it takes, means twelve cents a piece, including interest and depreciation of his outfit. As knowledge spreads on the subject you will find patients demanding radiography and going to the men who use the radiograph in their root canal work. In a large city ten dollars is not an unfair price for a first radiograph and further exposures of the same tooth may well be at a smaller fee or if there are several needed the charge for some may be omitted. Five, three or even two dollars may be a right fee in smaller cities where expenses are less.

Tonization.

Just a word about ionization. I am much interested in Dr. Rhein's work in that line, and acknowledge the definiteness of his proof that in some of his cases something has brought about regeneration of the bone in those cases, but I am not as positive as Dr. Rhein is that it is ionization as he defines it. I recently had an opportunity to talk with Dr. Price, who had made some of the most careful investigations concerning the possibilities along that line, and he says that the theory advanced by the advocates of ionization is impossible, and that the improved conditions they demonstrate must be accounted for in some other way. I would like very much to know what the introduction of gutta percha has to do with stimulating the vital processes at that point. The case described, from the hands of a Tennessee dentist was interesting on that point, and it recalls to my mind, that in the early nineties, Dr. Forrest G. Eddy, of Providence, was responsible for the adoption of the practice, in that portion of New England at any rate, of concluding the treatment of fistulous teeth by forcing chloro-percha solution through the root until it appeared at the mouth of the sinus on the gum and then filling the root in the ordinary way. Many operators reported the successful healing of fistulæ following this procedure.

I was much interested in Dr. Rhein's remark concerning the patient who attempted to dictate to him what was to be done. There is a text for a whole sermon right there. We are all familiar with a certain type of individual who, being successful in his own particular business, feels that his judgment should be accepted by all. He even expects to tell the professional man what ought to be done. When that type presents

itself it is well to kindly but firmly let him understand that your opinion must govern or he must go elsewhere.

We must develop procedures that keep pace with increasing knowledge or gain such a reputation as will set our profession back a generation. In the field we are considering I know of no better type of root filling than that which Dr. Rhein has advocated to-night.

I came here upon Dr. Rhein's invitation with the view of taking serious exception if he was unable to prove to me certain statements that he had made in the past. I was highly sceptical from a pathological

standpoint as to whether a foreign substance passed into the cancellous structure of the bone, about the end of the tooth, would be of any material benefit there. I must admit he has satisfied me that under strict aseptic procedure small extrusions of gutta percha may do no harm. Like many of you I resented the proposition that gutta percha passed through the end of the tooth would cause regeneration of bone. Dr. Rhein to-night claims that it is not the stimulation of the gutta percha that causes regeneration of bone. Now I am inclined to view the protrusion of the root filling merely as an index of the thoroughness of the work. The fact that the gutta percha goes through the end proves the work complete. However, it is clear from the pictures that Dr. Rhein has shown, that even after perfect root work abscesses may form if the periapical region has not been cleared of infection. The projection of gutta percha into the tissues is not essential as Dr. Rhein has demonstrated, in cases where root amputation has been performed. If everything is dealt with in a thoroughly aseptic manner and the canal is filled up to the point of root amputation, I do not believe there is any need for the gutta percha to protrude; in fact I believe it might be a hindrance.

Dr. Rhein brought out another point I want to emphasize. In cases where there has been no infection around the end, where you have taken out the pulp of the tooth while healthy, the root need only be filled to the end, providing you have removed all organic matter from that pulp canal, and you need not try to force it through into the healthy tissue.

You will notice that the things that have been learned in this field have been discovered more or less accidentally. I believe Dr. Rhein's observations have been largely due to radiography, and I want to assure you gentlemen, that the method Dr. Rhein advocates is not something for him to do alone, but it must be done by the whole profession, and it can be done. One of your own members this evening in a very modest way, handed up a radiograph that he had taken two weeks after he had installed an X-ray outfit, and he had radiographed a tooth that was as perfectly filled as any Dr. Rhein has shown.



I am intensely interested in this subject, not because I fill root canals; in fact I scarcely know why I should talk on the technique of it. I do wish to discuss the extensive involvements arising from these apical infections. I believe the blood stream itself is largely affected, and that a great many secondary conditions are brought on from this cause. There is scarcely a case of disease about the jaw which I operate on, in which the patient does not volunteer the statement that he never felt better in his life than after the operation. The question is a most vital one and it must be taken up as earnestly as Dr. Rhein has done. If ever Dr. Rhein has vindicated himself in regard to root canal work it has been here to-night. He does not pose as a man who is able to fill every root canal; he has been much condemned for claims he has not made, and I am proud to be here with him to-night with such a display as he has made, not alone of the facts but of his willingness to bring out his own shortcomings in the past in root canal work and in his search for the truth. I know of nothing that has come out in dentistry within recent years that carried with it so much importance, because, with a faulty foundation, how can you build up any tooth structure? Of what use is all the bridgework in the world if the foundation of that bridgework is faulty and is a menace to the health of the patient? If the tooth is worth anything to the patient, his health is worth very much more, and we are selling him a gold brick when we do work that is bound to do him more harm than good. Unless this question of pulp treatment of teeth is seriously taken in time by the dental profession, the medical profession and the lay public are going to rise in indignation and dentistry will almost come to the point where the man in England probably imagined it to be when he made the statement some time ago that a patient would be better off without any teeth.

In fact, one individual over there advocates the extraction of all teeth. If he had said he would extract every tooth in which the pulp canal treatment is not correctly done I would highly indorse his proposition. In fact, gentlemen, I am called upon almost every day, by patients who have been referred to me by physicians, for the wholesale removal of bridgework and bad dental work that is causing infection, and I believe there will be a revulsion of feeling so that plate work will, in a large degree, succeed bridgework in the hands of men who are not able to properly prepare the foundation for their dental work.

Dr. M. E. Rhein.
(Closing)

For thirty years I have seen the results of oral sepsis, and I have had some very unpleasant experiences in trying to call the attention of the profession to this. Now one of the greatest pleas-

ures in my life is to have lived to see the day when the profession in this country is awakening to the truth.

There are just two practical aspects of this question. Everything depends on the value which any individual patient places on the salvation of his tooth; how much he wants a bridge rather than a plate; and it is the duty of the dentist whom he consults to explain to him what pulp work now means, instead of what it has meant in the past. If he is unwilling to meet your requirements as to expense, then it becomes your duty to tell him that the only alternative with such a tooth, as far as the safety of his health is concerned, is to have it removed.

**Pulp Canal
Work in
Infirmaries.**

If I have impressed you with this point, I want to ask you, if the facts are true, how are you going to meet these conditions in the city dental infirmaries, such as are starting up all over the country and those you have organized so liberally in this city. How are you going to handle pulp treatment in the teeth of the children of the poor? Is it rendering a charitable service to do the kind of pulp treatment that is done in dental infirmaries at present, leaving children with a strong probability of endocarditis? Some of the diseases coming from the same source were mentioned to-night and I could go on and tell you about intestinal diseases; I could tell you about cases of gall stones; of ulcers in the stomach. I could tell you of all kinds of diseases that I have traced entirely to oral sepsis. We speak of endocarditis because the muscles of the heart seem to be the first that are affected. I claim that it is impossible to do proper pulp work in dental infirmaries. There is not the time, and so the operators should choose the lesser evil. We must sacrifice the teeth rather than endanger the health of these children. I claim that in our dental infirmaries of to-day, with our present knowledge of the subject, it is our duty to extract, and not stultify ourselves with incompetent pulp work. I have in my pocket a package of ten films. On Saturday afternoon I had one of the dentists at one of the orphan asylums in New York, bring to my office ten different cases where pulp work had been done in the mouths of the children dating back to 1910. One of them, done within six months, was absolutely free from any infection, but that was the only one of the twelve; with two of them the films are not quite distinct, and in the other seven the infections are most pronounced. Some of the cases were root amputations, but most of them were fillings with various substances, and the infections are as great as any I have shown you to-night. Here are children in one of the orphan asylums supposed to be securing the best kind of dental service, and what have they re-

ceived? One of those children came in limping, and I have no doubt it is due to an apical infection.

Tonization.

I am sorry Dr. Gillet has gone because he had not understood views on ionization. I do not claim it helps bone reproduction. I did not make that statement, and I did not mean that the use of ionization is for that purpose. In the case illustrated in Fig. 18 there was no ionization used, yet we see how nature reproduced bone when the diseased tissue has been absolutely removed, and no reinfection takes place, just as nature reproduces every other tissue that you give a chance to heal; just as the bone is reconstructed when there is a fracture of the bone. Why should there be an exception in the reproduction of the bone in the alveolar structure? There is none. What I claim for ionization is that by its use, if the periodontal tissues have not been injured so that the cementum of the root has become necrotic at that point, it is possible absolutely to destroy all of the infected part.

Ionization as I use it has conclusively proved to me that it will get rid of all of the pathologic tissues as thoroughly and effectively as we can do it with surgery. I claim that the bone will regenerate in spite of the gutta percha point if the gutta percha point is free from any septic possibilities around it. We all know how kindly tissues take to gutta percha; there is only one other thing I would rather put there if it were possible, and that is a high grade porcelain. I do not like to force a lot of gutta percha through, I would rather leave the ends of the root as Dr. Schramberg showed on his slide.

**Root
Filling
Materials.**

And that illustrates another advantage of gutta percha, which is that its softness enables us to compress it against the end of the root—a thing that no other root filling will do. Paraffin has been spoken of, and however much we can rely on it to remain intact in the root, we know that it will not remain on the outside of the root, and that puts paraffin out of the category of efficient root filling materials. We want no irritating root fillings; we cannot afford to use oxy-chloride cement and have its constant irritation prevent bone regeneration; we must have something that will not irritate the tissue.

I was asked by Dr. Waldron to explain how I use the gutta percha. You are supposed to have your root canal absolutely free to the end, clean. The last thing that I do, after I have used ionization, is to syringe out the canal with a solution of bichloride of mercury in hydrogen dioxide, one to five hundred. I use that solution because of the fixed amount of bichloride of mercury that is left in the microscopic openings of

the tubuli. I then have prepared in my office a solution of base plate gutta percha in chloroform. I do not want any oily preparation of gutta percha. I have used gutta percha dissolved in eucalyptus and other oils, and I do not want that kind of a preparation because it is impossible to extract the oil from it. I want to get rid of every drop of the chloroform during the filling of the root canal. The chloroform is only a medium for carrying the gutta percha into the canal. I use a series of gutta percha forms that are shaped like wire rather than cones. I have abandoned the gutta percha cone because it is a dangerous gutta percha point to use. I do not say that it cannot be used, but you are apt to make an imperfect root filling with a cone because you are liable to come to that point where you block the canal when the thick end of the cone can go no further.

**Technic
of Filling
Root Canal.**

Having washed out the canal with this solution I now dry it with warm air, and I use what is known as the Young broach and wrap it with a fine wisp of cotton. I frequently introduce a little chloroform first and follow it up with the hot air. I want the chloro-percha when it goes into the root canal to meet a dry surface all around, to which it will adhere all the way down, so that when I fill in with a point of gutta percha, I am not only forcing the gutta percha through the opening in the foramen, but literally into the microscopic tubuli, in the decalcified dentine, and, of course, it is understood you are to do this with absolutely aseptic precaution. I scrub my hands the very last thing before I introduce the chloro-percha, and my assistant does the same. My gutta percha points are now placed in a bath of ten per cent. formalin, so that there can be no infection on the gutta percha. With a pair of forceps I take the gutta percha point onto the napkin and fold the napkins over it carefully; the assistant stands at the left side of the chair, with an alcohol lamp and with my aseptic forceps, I introduce the point carefully into the root canal and, with gentle pressure, press it down as far as possible and then proceed to follow up the process of forcing my gutta percha point carefully down. Then I add another point in the same way and may add a third point according to the diameter of the canal, compressing it as well as I can with a plugger. I now take that plugger point and wrap a little wisp of Japanese paper around it, and dip that in chloroform and introduce that plugger with the chloroform dipped paper into the canal and proceed to tamp that gutta percha with the plugger, the same as a laborer tamps his concrete pavement, doing it again and again; you can only learn by experience how much of this is requisite. When you have finished your gutta percha points are forced into one homogeneous mass that absolutely fills that canal. Your chloro-



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form is being forced out the end of the foramen at one end and at the other is easily evaporated with your cold air. If I am going to use a root for a crown, I sometimes use only half of a point of gutta percha, and if I am going to bring the filling away up, I may use six or eight points, running down to a number five or a number four. When I am all through and my assistant has stopped blowing the cold air on the gutta percha so that we know the evaporation is complete, I cover the gutta percha with oxy-chloride of zinc cement. That is placed over it to prevent any possible infection from the crown of the tooth into the root canal. I have never detected the faintest odor in any root canal that I have filled and as you have seen to-night I have opened a number of old fillings of my own and it has simply been a question of the difficulty of reaming them out.

I wish I had the time to go into the subject of radiography, because I would like to point out to you that when I said that seven per cent. of the cases is a safe allowance for teeth that cannot be properly filled, it is by means of radiography I have been able to determine that percentage; by its use you are able to see exactly the shape and form of the root.

I must apologize for going on so late, but it has been because of the way in which you received me, but I must stop at this point and I thank you again and again for the generous reception you have given to me.





The Sealing of Apical Foramina with Gutta Percha and the Regeneration of Bone Thereabout.

Science is "Knowledge gained and verified by exact observation and correct thinking" (*Standard Dictionary*). Hence no fact alleged to be scientific can be counted a scientific fact, so long as men competent to make exact observations and to think correctly, maintain opposing views thereon. Where such opposing views exist about a fact of importance, it follows that discussion must continue until one view alone be adopted by all the disputants. Such discussion can lead towards final conclusions only when conducted impartially, dispassionately and impersonally. In scientific debate there can be neither fear nor favor. The following views are volunteered with full conception of the above restrictions, and the writer is quite as willing to be proven wrong, as to prove himself right.

In the *Dental Cosmos*, for October, appears a paper read before the New York State Dental Society by Dr. Clarence J. Grieves (p. 1112-1127) and a discussion thereon (p. 1143-1155), to which latter the present writer was a contributor. The closing discussion by Dr. Grieves, with the consent of the society, was written after the meeting, and it is this closing argument which reopens the subject.

As a contribution to the discussion as to whether or not new bone may be regenerated about or around gutta percha, I exhibited radiographs of two cases. In one an implanted tooth had been lost by re-

sorption of the root, which uncovered the gutta percha in the canal, and the radiographs show new bone built tight against this gutta percha. In the other a gutta percha cone had been protruded through an apical foramen into a space caused by an alveolar abscess, yet from a subsequent radiograph I declared that the new bone had built about this protruding gutta percha (see illustrations, *Dental Cosmos*, p. 1151).

In response Dr. Grieves has this to say:

"Dr. Grieves.—I wish first to thank Dr. West for his remarks, and to take up the slide which I requested Dr. Ottolengui to show us. You will recall that the tooth, extracted and filled with gutta percha, with its apex trimmed as usual, had been successfully implanted for some time. The series of excellent slides shows a progressive resorption of this root, as is observed in all implanted teeth, which finally reached clear down to the gutta percha root-canal filling, leaving it in perfect contact with the alveolar bone. It is well recognized that all implanted teeth are attached by ankylosis, and do not normally sway as do those with normal periodontal membrane, and that the deposit of alveolar bone in the resorptive bays cut in the roots holds the tooth rigid; it is also known, from comparative anatomy, that this very rigidity finally accomplishes the destruction of every implanted tooth, because in the freely moving mandibular articulation of all the mammalia there is no known instance of the occurrence of this type of "bone of attachment" which is found in the lower orders. The point I wish to make clear is that this gutta percha filling was at first firmly fixed in the alveolus by the very process of resorption and deposit, the reparative process in a tissue, the cementum, with which the cells can lie in physiologic contact, and it was not, as I said in the paper, swaying as a normal mammalian tooth attached by periodontal membrane should.

"The last slide more than proves my contention, because as soon as enough of the root was absorbed to allow motion, and the tooth began to tilt, the gutta percha root-filling, firmly held in the bone, fractured. In the last slide you noted the large area about the portion with the gutta percha apparently protruding, which moved with the tooth, and particularly good bone about that which did not move. I am deeply obliged to Dr. Ottolengui for bringing this slide, and I call your attention to his statement that he intentionally perforates and projects his filling only in abscess cases, or where there has been destruction of periapical tissue, while Dr. Rhein claims to perforate and protrude his filling in every case."

**Reply to
Dr. Grieves.**

Dr. Grieves here claims that the bone built tight against the gutta percha exposed through resorption of the root of the unplanted tooth was so built because of the fixation of the parts by ankylosis, and

he points to the "large area" about the gutta percha which protruded through the root of the other tooth, declaring that this "large area" (meaning an area unfilled with new bone) existed because of the normal sway of the tooth in its alveolus.

I believe that Dr. Grieves here overestimates two things. First, the alleged unfilled area about the projecting cone of gutta percha seemed large to him because of the magnification of the picture when thrown on the screen. The radiograph, which by positive measurement pictures the parts practically of exact size, discloses the fact that this unfilled area is so minute as to be negligible. (See illustration in *Dental Cosmos*.) Secondly, I think that Dr. Grieves overestimates the extent of sway of a tooth root in its socket. It does not swing as a pendulum freely moving in space, but its soft tissue attachment to the alveolar bone permits a slight movement under stress. Moreover this movement is more vertical than horizontal. The so-called apical space, is a space only in the sense that the distance between the apex of a tooth and the extreme bottom of its alveolus, is greater than the distance between its side, and the walls of the alveolus. But this "space," both below and around the root, in a state of health is filled with pericementum, the elastic ligaments of which both permit and restrain the movement of the root when stress is met.

I cannot believe that this movement could interfere with the slow processes which produce a metamorphosis of the granulation tissue which first fills a pathologically produced cavity at the end of a root, into true alveolar bone, especially when I think of fractured jaws which reunite in spite of the fact that no interdental splint yet-invented ever immobilized the parts so that they moved less than the distance of a root swaying in its socket.

**The Real
Point of
Importance.**

But as a matter of fact we seem here to be discussing a point of slight importance. Even granting the existence of a "large area" about the projecting gutta percha point which has not been filled with bone, is it not probable that this locality which shows as a light area in the radiographs, is at least filled with perfectly healthy granulation tissue? And if so does this not establish the only fact which the illustrations were introduced to prove, viz., that an aseptic point of gutta percha might protrude through a root end, and yet cause no interference with a perfect healing?



**Protrusion
of Root Fillings
Through Apices.**

It never was my intention to advocate the protrusion of gutta percha cones through the apices of roots. But it is a fact that with the technique which I do advocate, such an accident is occasionally unpreventable unless we stop short of reaching the apex when introducing the root canal filling, but since we have proven that such protrusion of a cone produces no trouble if the operation be aseptic throughout, it is far less undesirable than leaving the apex unfilled, since it can be abundantly shown that such unfilled apices always invite infection, and that these invitations are commonly accepted with dire results to the patient.

It almost seems as though Dr. Grieves must misunderstand those of us who advocate the extension of a root filling apex through the apical foramen. He speaks of my "perforating and projecting root fillings." Elsewhere he tells us: "You must either protrude the gutta percha point every time, or not at all, to be consistent." It seems a fair deduction from this that he must believe that the advocates of this method of sealing the apical foramina of teeth deem it desirable to protrude a gutta percha *point* through the foramen. But no one to my knowledge has ever advised this. Certainly I have not. The protrusion of the gutta percha point is never intentional, but it is sometimes an unavoidable accident, and for this reason cases where such protrusions have occurred have been watched and periodically radiographed, with the result that I have several series of radiographs which, at least to me, seem to demonstrate progressive improvement with increasing deposition of bone. From these demonstrated facts I argue, not irrationally I think, that the protrusion of a gutta percha point need cause no anxiety, provided the point be absolutely aseptic. But I do not advocate nor advise the intentional "perforation and projection" of the point which Dr. Grieves attributes to me. On the contrary, in the very case illustrated with radiographs showing what I conceive to be growth of new bone about a projecting gutta percha point, I specifically mention the fact that the point passed through the apex "accidentally."

In describing my own technique, in this discussion, I first said that where we remove a living pulp and have every reason to believe the pericementum to be alive and healthy, "I can see no reason why we should

protrude broaches, wires or gutta percha or anything else through the apex of the tooth." Then later, in cases of known infection, after thorough sterilization I say, "the canal must be filled with chloro-percha sufficiently fluid to be forced into the extra foramina and through the major foramen out of which it should exude so as to flow over and around any part of the apex which is denuded of pericementum, thus not only coating the root end with an aseptic non-irritant shield, but at the same time covering over the outer openings of the extra foramina."

There is nothing in this language which can be construed into the advocacy of the intentional protrusion of gutta percha *points*. Nor is it advisable that any excessive quantity of *chloro-percha* should be forced through. The operation of forcing chloro-percha (not gutta percha *points*) through the apex, if skillfully done will encapsulate the root end provided it be denuded of pericementum, and will fill the funnel-shaped orifice of the canal. In connection with funnel-shaped, crater-like apical foramina, we often get radiographs in which the root filling appears to have a knob at the end, the truth being that this knob-like mass does not extend beyond the apex, as it appears to do, but merely fills the aperture, as no gutta percha point ever could do.

I hope that I have here made it clear that I do not advise the projection of gutta percha points through root canals, though I do deem it necessary that the root filling should adequately seal the apical foramen, to accomplish which it must always pass fully through the foramen, and in cases of infection a sufficient quantity of chloro-percha should pass beyond the apex to encapsulate the denuded cementum.

The Medico-Chirurgical to Merge with The University of Pennsylvania.

The following announcement, published in the *Philadelphia North American*, October 13th, will greatly interest the medical and dental professions of this country:

"With the Boards of Trustees of both institutions favoring the proposition, only financial problems remain to be solved before the final acceptance of tentative plans for merging the Medico-Chirurgical College and Hospital with the Medical School of the University of Pennsylvania.

"Special committees of both institutions now have the financial



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problems under consideration, and it is believed a definite financial solution may be ready for submission to the Board of Trustees of the University of Pennsylvania on Monday.

"The plan of merging the two medical schools includes the creation of a great post-graduate school of medicine with a \$1,000,000 medical college building on the parkway. In this college the scientific resources of both the University and Medico-Chi would be combined. A movement is also under way to invite the Jefferson Medical College and other medical schools in the city to join in the formation of the greatest post-graduate school of medicine in the country.

"The merger plan, which met with favor from the Board of Trustees of the University of Pennsylvania last Monday on motion of John C. Bell, was approved the same night by the special committee of the Medico-Chirurgical College and Hospital Board of Trustees, headed by Dr. James M. Anders.

'Chi' to Retain Entity.

"Among the features of this merger plan the most important are that the Medico-Chirurgical College shall continue its hospital under the name of the Medico-Chirurgical College Graduate School in the University of Pennsylvania, and that the clinical professors of the Medico-Chirurgical College shall constitute the staff of instructors.

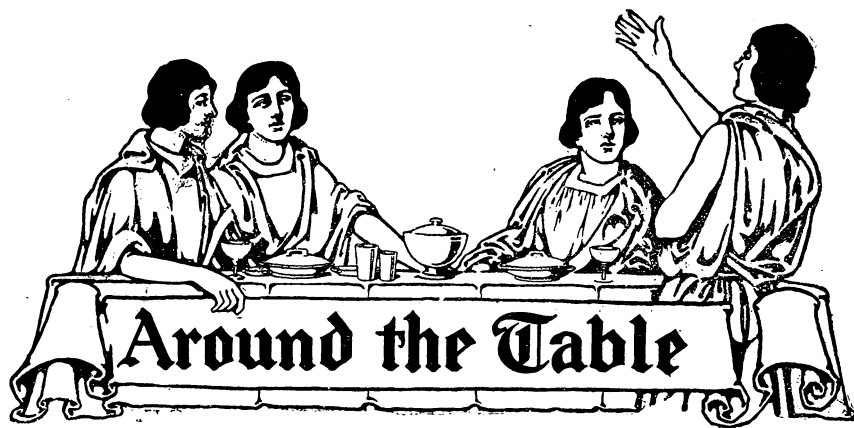
"The scientific professors of the Medico-Chirurgical College are to join the faculty of the medical school of the University of Pennsylvania in instructing undergraduates in medicine, and will retain their present rank.

"The dental school of the Medico-Chirurgical College is to be merged completely into the dental school of the university, the latter taking over both the faculty and students of the Medico-Chirurgical College.

"The present school pharmacy of the Medico-Chirurgical College is to be continued as a distinct and separate branch of the University of Pennsylvania as its department of pharmacy.

"The buildings of the Medico-Chirurgical College not taken away by the Parkway are to be remodeled and furnished, together with additional buildings.

"A new hospital, with 200 ward beds and not less than fifty private rooms, is also to be erected if the present Medico-Chirurgical Hospital is taken by the city, and this new hospital is to have a professor in clinical chemistry and one in clinical pathology, with ample laboratory facilities and a separate X-ray department.



WE WERE ALL AT LUNCHEON one day at the Clift House. Clift House, ❖ not Cliff House. The Cliff House is out by the Seal Rocks, where the ❖ seals are—sometimes. The Clift House is right in the heart of the city, ❖ where the Dentist were—one time. I am talking about San Francisco, ❖ but you knew that, of course. Well, anyway, there we all sat, each ❖ fellow taking his little sweet roll, from the sweet little Chinese maid, ❖ in her, pretty blue velvet dress, and trying to pretend he was looking ❖ at the dish of rolls, and not peeking at the girl; no, I did not say Pekin ❖ girl.

❖ ❖ ❖

PRESENTLY ONE OF the Frisco fellows turned to me and said: "You ❖ have had a lot in your magazine lately about the Average Dentist. ❖ What does that mean? What is the Average Dentist?"

❖ ❖ ❖

"SUPPOSE WE MAKE A RIDDLE out of it," said a Party from Portland. ❖ "Put it this way, 'When is a dentist not a dentist?'"

❖ ❖ ❖

"WHEN HE IS an orthodontist," cried an Angle School graduate.

❖ ❖ ❖

"MANY A TRUE WORD is spoken in jest," retorted the Portland Person, ❖ and the Orthodontist was sorry he had spoken. "The riddle is a good ❖ one, and must be answered before you can define 'Average Dentist.' ❖ Before we can strike an average we must know what the two extremes ❖ are. We know how high a man may get and still be a dentist, but some ❖ one tell us how little skill a man may possess before he loses the right ❖ to be called a dentist. Again I ask, 'When is a dentist not a dentist?' ❖ Don't all speak at once!"



"I HAD AN EXPERIENCE recently," said the man from Salt Lake, "which
❖ may throw light on your question. A woman came into my office to
❖ ask my opinion upon advice given her by another man. In the upper
❖ jaw she had only the six anterior teeth left, and all were afflicted with
❖ pyorrhea. The man she had last seen told her that the only way to
❖ save her teeth was to cut off the crowns and attach a fourteen-tooth
❖ fixed bridge. Although she had not consented to this, he 'treated' two
❖ of her teeth before she left the chair. It was partly because she did
❖ not wish her six front teeth cut off, and partly because the 'treated'
❖ teeth had ached continuously, that she came to me. On examination I
❖ found that the fellow had drilled holes in the approximal surfaces of
❖ the lateral incisor on one side and the cuspid on the other, and had
❖ applied arsenic. Query! As he must drill a hole in the lingual surface
❖ to remove the pulp, why drill one in the approximal surface, through
❖ which he never could remove the pulp? I think that man is 'no dentist.'
❖ Yet he has a license."

□ □ □

"NOW YOU HAVE SAID SOMETHING," said the Seattle man. "Where
❖ does the dentist who is not a dentist get a license?"

□ □ □

"WHY, FROM THE EXAMINER who is not an Examiner," replied the
❖ Professor from the University. "You have all heard of Examiners who
❖ examine dental graduates, but did any of you ever hear of an Examining
❖ Board that visited a Dental School to examine the school, or to discover
❖ what the students are taught, or to investigate the methods of college
❖ examinations? Where does the Average Examiner learn how to
❖ examine?"

□ □ □

"WHY FROM THE QUIZ COMPENDS," said the Salt Lake man. "The
❖ riddles all seem easy to-day. We started with the Average Dentist,
❖ and here we have drifted to the Average Examiner. But I guess that
❖ is a logical sequence, though I think that it should be reversed, for
❖ surely it is the Average Examiner who licenses the Average Dentist."

□ □ □

"THERE IS NO DOUBT," said the Portland Party, "that if we had more
❖ Examiners above the average, the Average Dentist would possess a
❖ higher average of genuine usefulness in the community. But perhaps
❖ the Average Dentist is good enough now. It is the man below the
❖ average that I am asking about. The dentist who is not a dentist, even
❖ though he may have a license. What is the answer?"

□ □ □

"SUPPOSE YOU TELL US, since you asked the question," said the Pro-
❖ fessor.

□ □ □

"WELL, THEN," said the Party from Portland, "take the case described
❖ by our friend from Salt Lake. That man not only is no dentist, he is
❖ not even a mechanic, and as the case is typical of a condition often met,
❖ let us analyze it a minute for the benefit of other dentists who are not
❖ dentists, or, better still, for the 'near dentists,' in the hope that they
❖ may get nearer. What are the facts? The patient has only the six



❖ anterior teeth left in the upper arch; they are afflicted with pyorrhea, ❖ and presumably more or less loose. The alleged dentist advises cutting off the crowns and attaching a fourteen-tooth fixed bridge. Our ❖ critical friend here calls him no dentist because he drilled holes in the ❖ approximal surfaces for the application of arsenic; but there was ❖ nothing inconsistent in that. If the entire crown was to be cut off ❖ finally, it mattered little where the primary attack on the tooth was ❖ made. My friend here, being a real dentist, takes exception to the ❖ drill hole in the approximal surface, because as soon as the patient ❖ reaches his hands, the idea of sacrificing the crown is abandoned. Ergo, ❖ if the crown is to be saved, and as a hole must be drilled lingually in ❖ order to remove the pulp, now suffering from arsenical poisoning, it ❖ seemed senseless to have drilled the hole in the approximal surface, ❖ which, of course, weakened the tooth unnecessarily."

□ □ □

"WHAT THEN DO YOU THINK was the man's mistake?"

□ □ □

"GOING BACK TO A STUDY OF CONDITIONS, what do we find? Six

❖ anterior upper teeth resisting all the stress of occlusion whenever the ❖ jaws are closed: the attachment of the roots to their socket walls ❖ weakened by disease. The lingual surfaces of these teeth are inclined ❖ planes, and the normal overbite, of course produces a closure of the ❖ lower incisors against these inclined planes. Purely as a problem in ❖ mechanics what must be the result when the power arm, the mandible, ❖ is constantly delivering stressful blows against the weakened resistance ❖ of these inclined planes? There can be but one result. Those ❖ teeth must constantly move labially, and as they do so the inclination ❖ of the planes increases, while their power of resistance to the blows ❖ delivered by the mandible proportionately decrease. That is the mechanical result. What is the pathological outcome? The enviroing ❖ tissues about the teeth cannot recover from a state of disease and return to a state of health when traumatic injuries are renewed daily. ❖ Hence I say that dentist was neither a dentist nor a mechanic. For ❖ what was his solution of the problem? A fourteen tooth fixed bridge. ❖ Imagine such a structure in place, and again let us consider the mechanics. The patient undertakes to incise a piece of bread. To do ❖ this he moves the incisive teeth to an end-to-end bite, during which, of ❖ course, the bridgework attached to these teeth and extending posteriorly in no manner relieves the stress upon the upper anterior teeth, ❖ but as the anterior teeth move forward in their sockets during the act ❖ of incision, the bridge extensions drop down slightly, and thus become ❖ two long lever arms for tilting the anterior teeth lingually again on ❖ complete closure of the mouth. But the mischief not only occurs during the act of incision, but likewise during the act of mastication, ❖ because the normal yield of the gum tissue will allow a vertical movement ❖ of the bridge extensions with every act of chewing, and these lever ❖ arms bridged to the anterior teeth, must move the front teeth back and ❖ forth in their sockets constantly. Physiologically, therefore, the disease cannot be cured because of the constant trauma. Yet the fool



- ❖ said that this would be the only means of saving the teeth, whereas it
- ❖ provides the surest way of causing their loss."

□ □ □

"I LIKE YOUR ANALYSIS of this condition," said the Seattle man, "and

- ❖ quite agree with you that a fixed bridge on those teeth would be disastrous. But now, I think we all would be interested in having you
- ❖ outline a plan of treatment. As you say, those front teeth are suffering from trauma, but how will any sort of appliance prevent the continuation of the abnormal stress long enough to permit recovery from
- ❖ the pyorrhea?"

□ □ □

"YOU NEARLY GUESSED IT YOURSELF," said the Portland man. "It

- ❖ may not be easy, but a masticating apparatus must be supplied with which
- ❖ the patient can eat without causing stress on the front teeth or the case is hopeless, and extraction may as well occur at once as later.
- ❖ Take an analogous case. A man breaks his leg. Do you expect the bone to reunite if he walks on it constantly? Fixation being necessary,
- ❖ you apply a plaster splint. If that does not suffice you confine the patient in bed, and compel disuse of the sick member. There is your philosophy! Pyorrheal teeth suffering with trauma, must have complete rest; the rest which comes from total disuse if possible. In the case under discussion, absolutely the first step in treatment should be
- ❖ a plate over the roof of the mouth carrying bicuspid and molars which should be long enough to make it impossible for the incisive teeth to come into contact. This plate must be so constructed as to preclude
- ❖ all possibility of delivering stress against the lame teeth. Then the patient must be forbidden to eat with the anterior teeth. Food must be cut small enough to be passed back to the molar region for immediate mastication; all incisions to be avoided. Treatment of the diseased condition may now be inaugurated with some hope of success,
- ❖ and what is more, as the disease yields to instrumentation and medication, lip pressure will gradually force the protruding teeth back to the normal. When all teeth are healthy and firm in their sockets, a permanent appliance may be supplied."

□ □ □

"BRAVO! BRAVO!" said the Professor. "We may not know when a dentist

- ❖ is not a dentist, but we do know a real dentist when we meet one, and
- ❖ I guess one lives up in Portland. Anybody else want to contribute
- ❖ to the theme?"

□ □ □

"LET ME HAVE ANOTHER CHANCE," said the Orthodontist. "I think

- ❖ a dentist is neither a dentist nor an orthodontist when he extracts a sound bicuspid to 'make room' for an outstanding cuspid."

□ □ □

"OH! YOU ORTHODONTISTS are too narrow minded," said a fellow from

- ❖ the same town. "Circumstances alter cases! I have done that same thing myself, and I guess I am a dentist." "Have another guess, Jack, and charge it on my check," interrupted a Wit, but the speaker, not one
- ❖ whit disturbed, continued: "I knew a man once, and judged by the fees



❖ he charged he was 'some' dentist; yet listen to this tale of woe. A
❖ patient of mine was in his town and he filled a large cavity in an upper
❖ first molar for her. Two hours—thirty dollars. Tooth ached. Third day
❖ dentist declared, 'Well, there must be something the matter with the
❖ nerve.' He said 'nerve,' not 'pulp,' nerve being more in his line. Treat-
❖ ment: He removed the thirty-dollar gold filling, found a 'horn of the
❖ nerve diseased,' amputated said horn, capped wound in nerve, and re-
❖ placed gold filling. Fees, twenty-five dollars for 'operation on nerve'
❖ and thirty for replacing gold filling. Week later, tooth still aching.
❖ 'Evidently nerve more diseased than I thought,' remarked the dentist.
❖ Filling removed, arsenic applied, nerve removed, roots filled, gold filling
❖ replaced. Itemized bill as follows: Treatment of diseased nerve, fifteen
❖ dollars. Removal of nerve, three roots at ten dollars each, thirty
❖ dollars. Filling of three roots, at ten dollars each, thirty dollars. Gold
❖ filling, thirty dollars. Was that fellow a dentist?"

❖ ❖ ❖

"NO! HE WAS A CROOK!" (Omnes.)

❖ ❖ ❖

"AS HAVING A POSSIBLE bearing on the subject before us," said my
❖ friend from Brooklyn, "let me read you a letter sent to me by a brother
❖ practitioner, which I happen to have with me. Here it is. He writes:
❖ 'I want you to decide a small bet that I have made with a brother den-
❖ tist. He told me that he inserted a one-tooth bridge recently and the
❖ shell crown fitted so accurately that he was obliged to drill a hole in
❖ the crown to let the excess cement escape; and that otherwise he could
❖ not have forced the bridge to place. I told him that I considered it
❖ very poor dentistry to drill a hole in the occlusal surface of a crown to
❖ let out cement. But he insisted that many dentists do that; in fact, he
❖ said, that if a man is skillful enough to make a crown fit tight, that is
❖ the only way it can be set. He was so sure he was right, he said he
❖ would make a wager with me and leave the decision to any first-class
❖ dentist, so as you are a first-class dentist, I ask you to decide the bet!'"

❖ ❖ ❖

"YOUR FRIEND GIVES YOU a very good character," laughed the Salt
❖ Lake man. "Did you reply?"

❖ ❖ ❖

"I HAVE A COPY of my answer with me," said the Brooklyn man. "It
❖ reads as follows: 'I can hardly believe the gentleman who made the
❖ statement regarding the perforation of gold crowns to permit of their
❖ better adjustment was serious. If he really meant it, I am extremely
❖ sorry for him. The fact that the cement would not permit of a proper
❖ adjustment of a gold crown without such a procedure is no evidence
❖ of its being an accurate fit. I should consider it rather an evidence, first,
❖ of an imperfect mixture of the cement; second, a ridiculously large
❖ surplus, and third and more important than all, an imperfect root prep-
❖ aration. If such a procedure is customary among many "first-class
❖ dentists," as you term them, it is beyond my knowledge, and evidently
❖ my professional associates are not in that class. Personally, I do not
❖ want to be one of them.'"

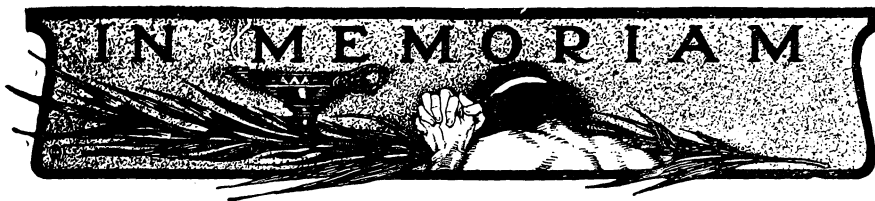
AT THIS POINT I thought it time that I should say a word. "Well!" said I. "Now that we know when a dentist is not a dentist, and when a first-class dentist is not fit to associate with, perhaps I ought to call for the original question, 'What is an Average Dentist?' Let me say that I came West thinking that he existed only in the East, but I found him all along the Lincoln Highway and in all the by-ways, too. So perhaps I can describe him to you. Usually he is a dentist with an average clientele, made up of people who earn average wages. He himself pays an average rent for his office, average salaries to his assistants, and gives an average allowance to his wife for household expenses. But when you suggest to this Average Dentist that he should fill root canals properly, he tells you that it is impossible for him to get paid for doing good work in this particular field, because he cannot charge what the men with rich clients charge. Now the odd thing is that this Average Dentist has no difficulty in collecting fees satisfactory to himself for any other sort of work. He does filling of all kinds—amalgam, cement, gold, and even porcelain. He makes plates on vulcanite, aluminum, or even gold. And he does bridgework. Yes, indeed! He certainly does bridgework. In fact, he is frequently a specialist in bridgework. I have known such a man to cut off two perfectly sound teeth in order to bridge in one missing member. He can persuade the patient to part with two perfectly good natural crowns and to receive in exchange two gold abominations with a false tooth between (I say false tooth advisedly), and he collects a satisfactory fee for this work, yet declares he could not properly fill the roots because the fee was too small."

■ ■ ■

"ARE YOU NOT A BIT SEVERE?" asked the Frisco Fellow. "Perhaps I am," said I. "Perhaps that sort of a man is not the Average Dentist. I guess he is below the average. But whenever the question of correct root canal work is discussed, we hear this same argument. I thought I had left all that behind me, yet at the meeting here this morning it was just the same old clamor. 'Radiography! Can't afford it! Can't afford it!' Did you ever hear a dentist say that he cannot buy a dental chair? Or a dental engine? You never have! Very well, then! When men come to appreciate the fact that an X-ray machine is just as essential in a dental office as a chair or an engine, then every man will have an X-ray machine."

■ ■ ■

"OH! VERY WELL," cried the Seattle man. Don't be so solemn about it, and we will all buy X-ray machines to-morrow. It is time to go over to the Congress again, but before we break up, let me tell you one on 'a dentist who is not a dentist.' Not much of a dentist, anyway. A short time ago an elderly man brought him an old upper plate, broken through the centre, and left it for repairs. My dental friend had never had any experience with celluloid, and did not recognize that this was a celluloid plate. Therefore he flaked it, opened the flask, cut away along the line of fracture, packed in some rubber, closed the flask and proceeded to vulcanize. Needless to say, when he opened his flask the plate had disappeared. When the man came for the plate, Mr. Dentist assumed his wisest air and remarked: 'I am sorry to tell you that that plate was so saturated with nicotine that the rubber was completely rotted, and went up like so much tinder when I attempted to vulcanize it.' The Old Man scratched his head, looked puzzled, and finally remarked: 'That's funny! I never knew before that Ma smoked!'"



Memorial Resolution

Adopted by the Faculty of the Dental School on Thursday Evening, September 23, 1915, at a Special Meeting, Convened to Commemorate the Life and Services of Dean Greene Vardiman Black.

The following resolution was prepared and presented by Doctors Noyes and Gilmer, and was unanimously adopted by a rising vote:

"The Faculty and teaching staff of Northwestern University Dental School enter upon their records this memorial of their beloved Dean, Greene Vardiman Black, M.D., D.D.S., Sc.D., LL.D., who died August 31, 1915, at the age of seventy-nine years.

"Dr. Black was a teacher in dental schools for forty-five years, with an interruption of only three years, during which time he was the first President of the Illinois State Board of Dental Examiners, in which office he continued for four years more after he resumed teaching (1881 to 1887). His first school work was as lecturer on Pathology, Histology and Operative Dentistry in the Missouri Dental College, 1870-1880. He was Professor of Dental Pathology in the Chicago College of Dental Surgery, 1883-1889. During this time, in 1887, he introduced the teaching of dental technique, by which the teaching of technical procedures in both operative and prosthetic dentistry are taught in laboratories, instead of depending, as previously, upon practical work in the clinic to acquired knowledge and skill in technical operations. This was an entirely new departure in dental teaching, which was very soon adopted by most of the schools throughout the country, and finally by all of them.

"He was Professor of Dental Pathology and Bacteriology in the Dental department of the University of Iowa, 1890-1891. In the latter year (1891) he entered the Faculty of this school as Professor of Dental Pathology and Bacteriology till 1897, when he became Dean and Professor of Operative Dentistry, Dental Pathology and Bacteriology, and continued until his death.

"The most important of Dr. Black's books are the chapters he wrote for the 'American System of Dentistry,' 'The Periosteum and Peridental Membrane,' 'Dental Anatomy,' 'Operative Dentistry' and 'Special Dental Pathology.'



"His nature was simple, sincere and approachable, and everyone who showed an interest in dental matters received a cordial welcome and always found him ready to impart knowledge. He was a friendly man and attracted everyone who came within the sphere of his influence. The greatest desire and ambition of his life, was to improve the standards and methods of dental education.

"While in practice he was a very exceptionally wise and skillful operator, and throughout his long life he was a hard student, a successful investigator and inventor, and probably the most useful and the most influential man in the dental profession.

"It would be interesting to tell of Dr. Black's studies and investigations that did not relate to dentistry. Two may be mentioned. He at one time made a study of the rings of annual growth in tree stumps to find out which were the wet and which the dry seasons, recorded in the varying thickness of the annual growth, and he found that his interpretations corresponded accurately with the recorded weather reports as far back as there were any such reports. At another time he worked out the life history of thirty or forty varieties of house molds. He was a many-sided man, and could do an astonishing number of different things, and do them better than other men could do them.

"The honor, admiration and affection we all felt for him can be only feebly expressed.

"We also desire to express to Mrs. Black, the devoted wife, our most sincere and deep-felt sympathy in her bereavement. While making full recognition of the services of her distinguished husband, we wish to express our belief that she was no small factor in his great achievements, and we desire to acknowledge at this time the sacrifices she made in aid of the success of his labors."

Dr. Greene Vardiman Black.

The members of the Minnesota State Dental Association wish publicly to express their sorrow in the death of their friend and associate, Greene Vardiman Black, and to that end resolve:

That the loss of a teacher so zealous in the cause of science, so warmly human in his devotion to the best interests of his students and his fellows, so distinguished in his far-reaching influence upon the standards and ideals of scientific education, is irreparable to the profession of dentistry.

That the warmest sympathy be extended to his family in their great bereavement.



That a copy of these resolutions be spread upon the minutes of the Minnesota State Dental Association, a copy sent to the family of the deceased, and a copy be sent to the various dental journals.

GLEN F. ANDREWS, Chairman

ROBERT WILSON

ALFRED OWRE

For the Minnesota State Dental Association.

Dr. Hereward Burbridge.

Dr. Hereward Burbridge died at his home in Woodstock, Vermont, September 9th, of diabetes, at the age of forty-three.

Dr. Burbridge was born of English parentage, August 9, 1872, in Walthamstowe, Engand, and came over to Canada at the age of fifteen. From there he moved to Windsor and began the study of dentistry in the office of Drs. Williams and Varney. Upon the death of Dr. Varney he entered into partnership with Dr. Williams.

He attended the Boston Dental College (now Tufts Dental College) and was graduated in 1898.

In December of that year he married Miss Julia A. Oakes, of Windsor, who with one son, Edward Oakes Burbridge, aged fourteen, survives him. Following their marriage they moved to Woodstock, where Dr. Burbridge practiced up to the time of his death. Dr. Burbridge was an active member of various societies and had been President of the Vermont Dental Society. He was often tempted to move from Woodstock to some of the larger cities, but his love for his townspeople and their real affection for him made him turn aside from these inducements.





Concerning the Death Attributed to Novocain.

Editor ITEMS OF INTEREST.

Dear Sir:

The writer having been requested by several friends to investigate the rumor that a death had occurred in the Mayo Clinics following the injection of novocain, begs to make known the following. Desiring to ascertain the facts in the case, the undersigned, in course of a letter to Dr. Truman W. Brothy, expressed himself as follows:

"My dear Dr. Brophy:

"Dr. Hinman on his return brought me the message sent by you concerning the death attributed to novocain.

"As you have foretold, some people are having a little unpleasantness with novocain, but this without doubt is due to carelessness, for, if care be taken, even pallor can be avoided, though these injections be made before an inquisitive audience. You will remember that even in college cases the color of the patient always remained the same. If the questions here enclosed will be productive of a reply from the Drs. Mayo, I shall give it publicity, *whether or not* it is favorable to my hobby."

The questions referred to above were forwarded to the Drs. Mayo and are reproduced below, along with the answers received. That I intended not to be partisan concerning what turned out to be an unfounded rumor is evidenced by my promise to make public the facts whether or not they were favorable. It is regrettable that just when some of the belated practitioners were about to be converted to this most simple, safe and efficient form of producing insensitiveness that such distorted information should gain currency.

Respectfully,

S. L. SILVERMAN,

Professor of Local Anesthesia and Radiology,
Associate Professor of Oral Surgery,
Atlanta Dental College.



June 24, 1915.

Drs. Mayo, Rochester, Minn.

Gentlemen:

- (1) Kindly give patient's history
- (2) Why was novocain chosen as the anesthetic agent?
- (3) (a) What per cent. solution was used?
(b) How much of the drug was used?
- (4) How long after interjection did patient live?
- (5) (a) Was synthetic suprarenin or adrenalin employed?
(b) If employed, was it incorporated with novocain in tablet form or was it added to pure novocain?
- (6) How much suprarenin was injected?
- (7) What was the character of the operation performed?
- (8) Was an endoneural, intravenous or infiltration anesthesia attempted?

The history may itself answer the 2d and 7th question, and in that event they may be left blank.

Very respectfully yours,

July 22, 1915.

Dr. S. L. Silverman.

Dear Doctor:

Your letter of recent date received regarding the case that died following the use of novocain. In reply, would say that we do not believe that the novocain was a factor in this case, and it could hardly be listed as a novocain death.

Yours very truly,

DRS. MAYO, GRAHAM, PLUMMER & JUDD.

GORDON B. NEW, M.D.

August 7, 1915.

Dr. S. L. Silverman

My dear Doctor:

Your letter of the 27th was duly received and I thank you for it. I am very glad indeed to learn that Dr. Mayo declares that the death which occurred following the use of novocain was by no means due to its action. I know that such rumors spread rapidly, but are most always distorted.

Very sincerely and fraternally yours,

TRUMAN W. BROPHY.



State Society Meeting.

OHIO STATE DENTAL SOCIETY, Columbus, Ohio, December 7-10, 1915.

Secretary, Dr. F. R. Chapman, 305 Schultz Bldg., Columbus, Ohio.

VIRGINIA STATE DENTAL ASSOCIATION, Richmond, Va., Nov. 4-6, 1915.

Secretary, Dr. C. B. Gifford, Norfolk, Va.

National Dental Association.

At the nineteenth annual session of the National Dental Association, held in conjunction with the Panama-Pacific Dental Congress, San Francisco, California, September 1st and 2nd, the following officers were elected:

Thomas P. Hirman, President, 4th National Bank Bldg., Atlanta, Ga.

H. B. Tileston, First Vice-president, 916 Starks Bldg., Louisville, Ky.

Arthur M. Flood, Second Vice-president, 240 Stockton St., San Francisco, Calif.

Wm. A. Giffin, Third Vice-president, 609-610 Washington Arcade, Detroit, Mich.

Otto U. King, General Secretary, Huntington, Ind.

Arthur R. Melendy, Treasurer, Holston Nat'l Bank Bldg., Knoxville, Tenn.

The next meeting will be held in Louisville, Ky., July 25, 26, 27 and 28, 1916.

OTTO U. KING, Secretary.



Panama-Pacific Dental Congress.

The Panama-Pacific Dental Congress has passed into history, and in accordance with the opinion very generally expressed by those in attendance, the meeting was a decided success.

The Pacific Dental Congress Commission of 1915, the corporation now in charge of all matters relating to the Congress, and the publication of the transactions, desires to announce that a copy of the complete transactions, when published, and a copy of the official souvenir program will be sent to any one making application therefor to the Secretary of the Commission, Dr. Arthur M. Flood, 240 Stockton Street, San Francisco, California, and forwarding the fee of ten dollars.

Those subscribing for these extra copies of the transactions cannot be regarded as being members of the Congress, not having applied for membership before the meeting, or being in attendance at the same, but we believe these transactions will be a very valuable addition to the history of dentistry, and the souvenir program, containing as it does many items of historical interest and value, will be acceptable to any member of the profession.

PACIFIC DENTAL CONGRESS COMMISSION OF 1915.

ARTHUR M. FLOOD, D.D.S., Secretary.

Ohio State Dental Society.

The Ohio State Dental Society Semi-Centennial Meeting and Dedication of the American Miller Memorial, at Columbus, will be held December 7, 8, 9 and 10, 1915.

The program of papers, so far as completed, comprises:

Dr. E. C. Mills, President's address.

Dr. Herman Prinz, "On Causes Concerning Susceptability and Immunity to Dental Caries."

Dr. George H. Wilson, "Some Problems in Mounting Full Artificial Dentures."

Dr. Chas. C. Voelker, "Some Places for Silicate Cements in Dentistry."

Dr. Geo. E. Johnson, "How to Read X-Ray Films."

Dr. J. H. J. Upham, "Pyorrhea Alveolaris From a Medical Viewpoint."

Fifteen-minute papers on practical subjects by:

Dr. W. O. Hulick, "Are Crowns and Bridges a Menace to Health?"



Dr. J. P. Benahan, "Conductive Anesthesia in the General Practice of Dentistry."

Dr. C. K. Teter, "Management of Difficult Extractions."

Dr. H. V. Cottrell, "Accessories to Articulation."

Dr. Gillette Hayden, "Differentiation Between Average Tooth cleaning and Prophylaxis."

Dr. L. E. Custer, subject to be announced.

Explanation of the Harrison Narcotic Law by the Deputy Collector of Internal Revenue.

Dr. Edw. C. Kirk will deliver the principal address at the dedication of the Miller Memorial statue on Wednesday afternoon, followed by Drs. T. P. Hinman, T. W. Brophy, N. S. Hoff, and others.

Thursday morning will be devoted to the presentation of a number of illustrated, descriptive clinics before the entire society, and Friday forenoon to a large number of general table and chair clinics.

On Wednesday evening a banquet will be served for our guests and members.

It is the expectation that this meeting will set a new high mark in State Society gatherings. Dr. Hinman, President, and Dr. King, General Secretary of the National Dental Association, will be present, and members from all State societies will be given a cordial welcome.

In view of the features of especial interest, we hope to have representatives from every State, inasmuch as nearly every State contributed to the expense of the Miller Memorial.

Please note the four-days' session and meet with us if possible.

F. R. CHAPMAN, Secretary.

305 Schultz Bldg., Columbus, Ohio.

Montana State Board of Dental Examiners.

The Montana State Board of Dental Examiners will hold a session for examination on January 10, 11, 12 and 13, 1916.

DR. G. A. CHEVIGNY, Secretary.

Butte, Montana.

North Carolina State Board of Dental Examiners.

The next meeting of the North Carolina State Board of Dental Examiners will be held at Salisbury, N. C., beginning promptly at 9:00 o'clock on Thursday, January 13, 1916. For further information and application blanks address the Secretary.

F. L. HUNT, Secretary.

Asheville, N. C.



Virginia State Dental Association.

The forty-sixth annual convention of the Virginia State Dental Association will be held in Richmond on November 7th, 8th and 9th.

The Jefferson Hotel will be headquarters.

This hotel is one of the handsomest, if not the handsomest in the South.

There is abundant room, just outside the Auditorium where the meetings will be held, for exhibits.

Exhibitors can communicate with Dr. R. C. Walden of Richmond, who is Chairman of Committee on Exhibits.

Dr. J. A. C. Hoggan of Richmond is Chairman of Entertainment Committee, and will gladly have accommodations reserved for guests.

GEO. F. KEESEE, Secretary.

200 E. Franklin St., Richmond, Va.

Pennsylvania Board of Dental Examiners.

The next regular meeting of the Pennsylvania Board of Dental Examiners, for the examination of applicants who desire to register in this State, will be held in Musical Fund Hall, Philadelphia, and the University of Pittsburgh, Pittsburgh, on Wednesday, Thursday, Friday and Saturday, December 15, 16, 17 and 18, 1915. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

The Board desires to call attention to the resolution adopted recently by the Dental Council requiring that matriculates in a dental college in 1915 shall have the equivalent of a four years' high school diploma at the time of their matriculation, in order to be eligible for examination by the Pennsylvania Board.

The dental law passed by the last session of the Pennsylvania Legislature makes it necessary for every dentist engaged in the practice of dentistry in this State to register with the Secretary of the Board of Dental Examiners before January 1, 1916, and annually thereafter, at one dollar per year. Blanks are being prepared and will be sent as soon as possible. Anyone not receiving the blanks can secure them from the Secretary.

ALEXANDER H. REYNOLDS, Secretary.

4630 Chester Avenue, Philadelphia.

Texas State Board of Dental Examiners.

Next regular meeting of the Texas State Board of Dental Examiners will be held at the Adolphus Hotel, Dallas, Texas, beginning Monday morning at 9:00 o'clock, December 13, 1915.

All applications should be in the hands of the secretary, together with the fee of \$25.00, not later than December 8th. Official application blanks will be sent upon request. For further information address

C. M. McCauley, Secretary.

840 Wilson Bldg., Dallas, Texas.

Massachusetts Board of Dental Examiners.

There will be a meeting of the Massachusetts Board of Dental Examiners for the examination of candidates November 16th, 17th, 18th and 19th. Information and application blanks furnished upon application to the Secretary,

G. E. MITCHELL.

Haverhill, Mass.

Iowa State Board of Dental Examiners.

The next meeting of the Iowa State Board of Dental Examiners will be held at Iowa City, Iowa, commencing Monday morning at 9:00 o'clock, December 6, 1915.

For full information and application blanks apply to

DR. J. A. WEST, Secretary.

417 Utica Bldg., Des Moines, Ia.

The Dental Commissioners of Connecticut.

The Dental Commissioners of Connecticut hereby give notice that they will meet at Hartford, on November 18, 19, 20, 1915, to examine applicants for license to practice dentistry, and for the purpose of transacting any other business proper to come before them. Application blanks, etc., will be mailed by the Recorder upon request.

By order of the Commission,

EDWARD EBERLE, Recorder.

902 Main St., Hartford, Conn.